COMMODORE USERS

Ahoy!

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VIEW FROM THE BRIDGE

"Telecommunicate!'?" you wail. "Why not tell me to 'Tintinnabulate!'...or 'Transubstantiate!'? Sure, it's the hottest home computer application going...but I *don't know how!*"

Relax. We're from *Ahoy!*...we're here to help you.

First, you'll need a modem. Technical Editor David Barron provides you with what we'll reluctantly term a "crash" course in *Modems: Making an Intelligent First Purchase.* (Turn to page 25.)

Then, Cheryl Peterson tells you how to ferret out and utilize *Local Bulletin Board Systems* (turn to page 22), and reviews a book on *How to Get the Most Out of CompuServe,* the telecommunications capital of the Commodore world (turn to page 50).

Beginning with this issue, *Ship to Shore* by James Irons Davidson will provide users with tips, answers to telecom questions, and the latest news. (Most important, it provides *us* with the opportunity to get yet another nautical title into the magazine!) (Turn to page 19.)

Just when you think you're really cooking with electronic heat, Gordon F. Wheat will positively electrify you with *Telelink 64,* a program which will, among other things, store, review, edit, and save incoming information. (Turn to page 14.)

Telelink, like many programs of superior capability, is written in machine language. But that's no problem for *Ahoy!* readers, thanks to *Flankspeed,* our new machine language entry program (turn to page 34). (You can expect to see fine machine language programs in all future issues of *Ahoy!*)

To those VIC owners who have never forgiven us for presenting Bob Lloret's *DOS* program for the C-64 in September and leaving them to struggle along: John Stilwell's *VIC Eraser* will boil down many of your most commonly used commands to a single keystroke. (Turn to page 49.)

Continuing our efforts to simplify your life, John C. Laws' *Fontasia* turns the complicated job of varying the parameters of your dot matrix printer into a job of Mickey Mouse simplicity. (Turn to page 26.)

Momentarily deserting the world of computer applications for a look on the grim side of life, Glenn Lumpkins' *Insurance Agent* will enable C-64 users to calculate the amount of life insurance they need to be sure of covering their families' present and future needs. (Turn to page 102.)

Are we sorry that B.W. Behling ever brought *Futurewar!* into our office! Not because we didn't thoroughly enjoy his simulation of earth's final global conflict—but because we barely pried the production staff away from the screen in time to meet the deadline for this issue! (Turn to page 118.)

Orson Scott Card takes it easy on you this month in *Creating Your Own Games on the VIC and 64,* foregoing the usual instructional approach to answer some questions from readers and analyze Chris Crawford's book on the theory of game design. (Turn to page 33.)

Dale Rupert, however, remains as merciless as ever, requiring you to earn admission into the ranks of users of *Sophisticated Sprites* by careful study of this month's *Rupert Report* (turn to page 29), and contributing his usual brutal round of *Commodares* (turn to page 99).

Morton Kevelson continues his update on *Printer Interfaces* with a look at Turboprint/GT, Grappler CD, Micrografix MW350, and Easy Print with Graphics. (Turn to page 103.)

We pick up this issue's telecommunications theme in our *Reviews* section, with a peek at the *Vortex* bulletin board program and the *SkiWriter II* word processor with built-in telecommunications capabilities, plus other items of interest. (Turn to page 37.)

You may have noticed that this issue of *Ahoy!* is the thickest to date. We hope to continue to grow in months to come and offer you an even greater value for your money. You deserve it. You put us here.

—David Allikas

"Now Your Commodore 64™ Can Print Like a Pro!"



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The Revolutionary Printer Interface for the Commodore 64™

A New Era in Commodore Printing Power.

Grappler CD offers the first complete answer to your printer interfacing requirements, with many powerful capabilities unique in the Commodore marketplace. Complete signal translation allows many popular name brand printers to operate perfectly with the Commodore 64, or to imitate Commodore's own printer. Even Commodore's graphic character set can be reproduced on Epson, Okidata, Star, ProWriter and other popular printers.

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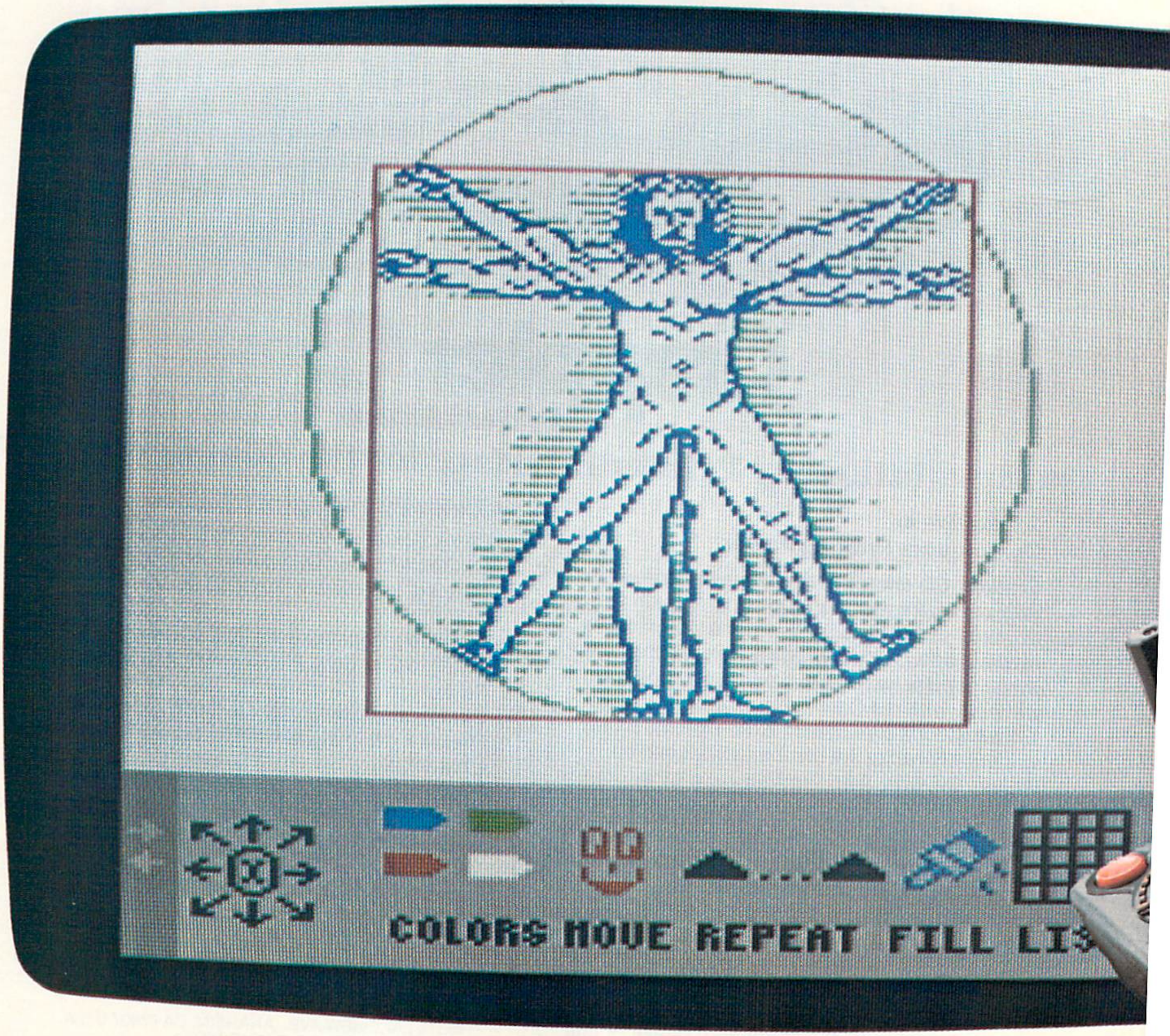
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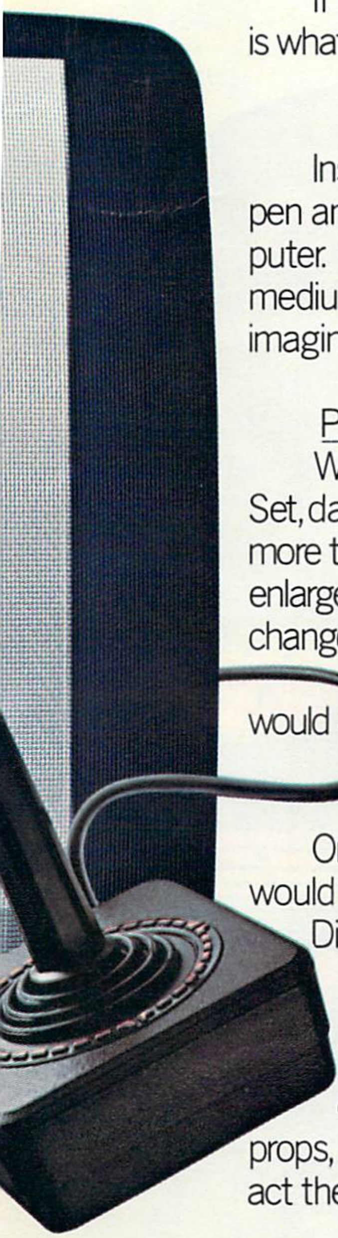
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Instead of a brush and canvas, a pen and paper, they'd create on a computer. Because Pixelwerks is the first medium that can keep up with their imaginations.

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And at the same time, he would be developing his programming skills. Painlessly.

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On the other hand, Shakespeare would love to play around with Show Director.

He'd use it to create plots and think up one scene after another, and he'd get a big cast of characters, lots of backgrounds, props, and musical sound effects to act them out.

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Dickens wouldn't be able to keep his hands off Bank Street StoryBook by George Brackett.

Not only could he write his own story, but he could also illustrate the scenes and characters he sees in his mind.

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Maybe Al Capp wouldn't be satisfied with cartoons that just sit on the page after he tried Mr. Pixel's Cartoon Kit. Because he could make his cartoons come to life by animating them. His characters could move around, and even react to each other.

Every kid has a touch of creative genius buried inside. The job of Pixelwerks is to bring it out, with more features, more options and more flexibility than other programs.



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COMMODORE SOFTWARE PRESIDENT RESIGNS

In a move certain to have a profound effect upon the software to come out of Commodore in the future, Sig Hartmann, president of the software division of Commodore Business Machines, resigned on October 26. Differences in philosophy and product strategies were cited as Hartmann's reasons for vacating his post, which has been filled by William E. Rothenbach, vice president of administration for Commodore. Rothenbach had formerly been head of software sales with Commodore, but left this position to work at Sperry Corporation under Myrdin Jones, also formerly of Commodore.

Hartmann was largely responsible for the establishment of the software division in early 1983 as a separate entity from the hardware division, functioning independently from the rest of the company in the areas of documentation and packaging. Prior to this move, Commodore's dominant interest was in development and sales of hardware. Hartmann's philosophy was that the long-term market centered around software, and he was able to persuade Commodore's then-CEO Jack Tramiel into forming the software division, of which he was appointed president.

Up to that point in time, Commodore's Achilles' Heel was the lack of software to support its then-new machine. Hartmann's primary objective in his newly created position was to produce and distribute abundant software products to bolster the introduction of the new computer in the marketplace. His operational credo was that people weren't going to buy a



Photo: Tom Benford

William Rothenbach, acting president of Commodore's software division.

computer if there wasn't any software to run on the machine. The accent was placed on quantity, with quality being of secondary importance in the product lineup.

Hartmann shifted his strategies to improving the quality of the products in early 1984 after the success of the C-64 was apparent and established. Problems started to arise when Marshall Smith became the new CEO of Commodore upon Tramiel's resignation. According to sources, Smith's philosophy differed from Hartmann's in that he wanted to see a decrease in the number of software titles from Commodore's in-house developers, with the majority of products coming from third-party developers. The benefits resulting from this strategy would be less risk, decreased costs, and less personnel required to maintain an equivalent number of products that would be of superior quality

Hartmann disagreed, believing that the highest profits were to be had by the division developing and producing a varied product library using a large base of in-house programmers and developers. Hartmann's strategy called for the software division to be the point of origin for the products, while Smith sought to have the division act as an acquisition arm for the company. Both men stood firmly with their philosophies, which eventually resulted in Hartmann's resignation.

Smith's belief is that by coordinating efforts with the marketing division of CBM, the product line will better reflect the kinds of software the consumer wants. Under the new structure, the software division will be under the jurisdictive wing of Commodore's marketing division, rather than a totally independent division. Speculation within the company is varied with respect to what the ultimate strategy will be.

Several questions are now raised. Hartmann had publicly stated on a number of occasions that "Commodore is in the software business," and geared the company's advertising and sales efforts along those lines. Does his resignation mean that Commodore is really withdrawing, even if in part, from the lucrative software market? As one high-level source put it, "They want to sell razors but leave the blade-making to other companies – it'll never work that way."

It is unclear whether Rothenbach will remain in this post or if it is only an interim move until a new software division president is named. As one source put it, "Until the dust settles, there's no way of telling for sure who the software division president will be – or even if there will be a software division as we presently know it." *– Tom Benford*

(And now the punch line: Hartmann has gone to work for his former boss, Jack Tramiel, as president of Atari software. We wonder if nineteenth century Europe could see the Nightmare Coalition forming so clearly before their eyes. – Ed.)

DISK CATALOGUER

Masterdisk will automatically read the file names from all your C-64 diskettes and build a sorted master catalog that provides file name search, duplicate ID flagging and changing, and other capabilities. The disk includes additional utilities like file transfer and disk copying. Price of the program is $29.95; reference card $2.00.

Integrated Software Systems, 428 Jewel Drive, P.O. Box 1801, Ames, IA 50010 (phone: 515-233-2992).

BATTERIES PAK

HomePak from Batteries Included provides integrated word processing, data management, and telecommunications programs on a single C-64 diskette.

HomeText includes such word processing features as full-screen editing, cut and paste, and graphic preview. *HomeFind* utilizes an overlapping index system and flexible query format, as well as "dynamic space allocation," which moves and rewrites information to make room for new entries. *HomeTerm* turns a modem-equipped system into a smart terminal with unlimited capture buffer and "X-Modem Protocol," insuring error-free information exchange.

Also from Batteries Included comes the *CalKit* spreadsheet, designed for ease of use and comprising 20 ready-to-use applications. Features include 99 row x 26 column format, independent variable column width, onscreen help menu, and extensive prompting. On disk for the 64.

HomePak and *CalKit* each retail for $49.95 (batteries included?).

Batteries Included, 186 Queen St. West, Toronto, Ontario, M5V 1Z1 Canada (phone: 416-596-1405; US number 714-979-0920).

TWO TYPING PROGRAMS

Though most of *Ahoy!*'s readers need typing instruction like Mr. T needs assertiveness training, newcomers to the keyboard may benefit from these C-64 disks:

Batteries Included promises that the traditional classroom techniques utilized in *Keys to Typing* will bring the student up to 40 words per minute in 32 lessons. Price: $49.95.

Batteries Included, 186 Queen St. West, Toronto, Ontario, M5V 1Z1 Canada (phone: 416-596-1405).

9 to 5 Typing from Epyx combines 49 drills with scenes from the film of the same name to teach seven basic typing skills. Price is $39.95.

Epyx Computer Software, 1043 Kiel Court, Sunnyvale, CA 94089 (phone: 408-745-0700).

RUN THE PRESSES

One of our favorite programs at

last June's Consumer Electronics Show was Broderbund's *The Print Shop,* which made it possible to write, design, and print personalized greeting cards, stationary, signs—even banners of any length desired. It had just one drawback for Commodore users: it was available only for Apple computers.

But Broderbund has finally converted the program for the C-64, featuring eight typestyles in solid, outline, and 3D formats and a variety of sizes, plus an array of pictures, symbols, and border designs. You may modify the provided graphics, or create your own.

Suggested retail price is $44.95; the supplemental *Graphics Library Disk,* with 120 designs, sells for $24.95.

Broderbund Software, 17 Paul Drive, San Rafael, CA 94903 (phone: 415-479-1170).

APCAD's TexED PE/WP

By means of a utility that converts sequential files to program files, APCAD's *TexED* text editor for the 64 and VIC is able to function as both a program editor and a word processor. Features include simultaneous line-image and visual editing, full-screen editor, and standard editing features not available for program editing with BASIC.

Available on cassette ($19.95) or diskette ($22.95); specify TexED64 or TexED20 (the latter requiring 16K RAM expansion).

APCAD, P.O. Box 83, Saline, MI 48176 (phone: 313-996-1448).

INTERCHANGE OF I.D.'s

Though your disk drive is fully operational, warns DYMEK Corporation, the data it writes may not be readable on another fully operational drive. Their RID (Recording Interchange Diagnostic) disk can test your Commodore-compatible drive for the seven parameters critical to interchangeability and data protection: speed, noise tolerance, write/read, track alignment, positioner backlash (hysteresis), disk clamping (eccentricity), and erase crosstalk. Price is $34.95.

DYMEK Corporation, 1851 Zanker Road, San Jose, CA 95112 (phone: 408-947-8700).

LIGHT ENTERTAINMENT

Lite-Sprite from Tech-Sketch lets you use a light pen to program sprites directly on your screen, designing in an eight-power magnification mode and modifying with an electronic editor. On disk for the 64; $49.95.

Tech-Sketch is for a limited time offering a free light pen with their *Kinderware* disk, consisting of six educational programs: *Math Fun, Al-*



Lite Sprite: ***design in eight-power magnification mode.***
READER SERVICE NO. 198

phabet Fun, Memory Jogger, Connect-A-Dot, Shapes and Colors, and *Simon Sez.* (We wonder if Tech-Sketch is throwing in the light pen to sell the software, or the other way around. The price of their light pen graphics system [LP-10S pen + Micro Illustrator software–reviewed in September's *Ahoy!*] has dropped from $69.95 to $49.95–generally, an indication of dim sales.)

Tech Sketch, Inc., 26 Just Rd., Fairfield, NJ 07006 (phone: in NJ 201-227-7724; rest of USA 1-800-526-2514).



Compares different tax strategies.
READER SERVICE NO. 199

OVERDRIVE

What Datamost did on a disk *(KwikLoad)*, Epyx has now done on a cart. With their *Fast Load Cartridge* plugged into your C-64 you can load about 95% of the programs on the market (including protected disks) up to five times faster and copy disks up to ten times faster.

Epyx, Inc., 1043 Kiel Court, Sunnyvale, CA 94089 (phone: 408-745-0700).

PILE MANAGEMENT

Two programs to help you manage the proceeds from that first big software sale:

Tax Command Planner lets the C-64 user compare different strategies at year-end to decide on the most advantageous, covering such topics as how to depreciate equipment, whether to sell stock, and how to make contributions at the lowest cost possible. On disk; $49.95.



Load disks up to five times faster.
READER SERVICE NO. 200

Practical Programs, Inc., P.O. Box 93104, Milwaukee, WI 53203 (phone: 414-278-0829).

Investment and Statistical Software contains 50 programs covering statistical forecasting, stocks, bonds, options, futures, and foreign exchange. Price of the C-64 disk is $100; handbook listing all 50 programs is $19.95.

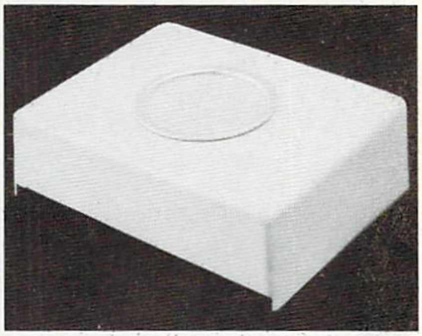
Programmed Press, 2301 Baylis Ave., Elmont, NY 11003 (phone: 516-775-0933).

KEEP A COOL HEAD

Because heat buildup inside your peripherals is not cool, we report on a pair of products designed to lower the mercury level.

The C-100 Disk Drive Fan perches atop your 1541 and blows filtered air through its vents. Drawing under 7 watts, it is available for $39.95 plus $2.00 shipping from Uni-Kool, 909 Williamson Loop Road, Grants Pass, OR 97526 (phone: 503-476-1660).

The Cool It fan attaches via velcro fasteners to any vented electronic equipment and blows air through a replaceable filter. Available for $39.95 (filter five-pack $4.99) from Proto PC Inc., 2439 Franklin Ave., St. Paul, MN 55114 (phone: 612-644-4660).



C-100 blows cool air in your 1541.
READER SERVICE NO. 201

ON THE MENU

The *Mr. Boston Official Micro Bartenders Guide* from Concept Development Associates combines the text and 1000 drink recipes of the famous handbook (now in its 50th year) with a program allowing selection of drinks using any combination of 21 search items and resizing from 1 to 999 servings. On disk for the 64; $49.95.

Continued on page 82

FOR COMMODORE 64

MAKE NO MISTAKE...

CALKIT for your Commodore 64 is a powerful, real-world problem solver. Faster, easier and more accurate than pencil, paper and calculator – and a lot less frustrating.



CalKit helps you solve household and small business problems that involve rows and columns of numbers.

- balance your chequebook in seconds
- plan your home or business budget with ease
- simplify your income tax, and your investment portfolio
- calculate loan or mortgage payments, and then find out what happens to them in seconds, when interest rates change

That's the real advantage – with CalKit, you can change any number in your equation, and see how it affects the other numbers. All calculations are performed instantly! CalKit gives you the answers, in the time it takes to ask "What If...?" You can make projections and plan ahead with confidence!

The CalKit problem-solving package includes built-in templates for the most important home and business needs. Over 20 ready-to-use, real-life applications on one disk. The rows, columns and calculations are already defined. No need for time-consuming initial set-ups – all you do is enter your data. Other CalKit features, like on-screen menu and simple commands, make it even easier.

An easy and comprehensive manual with tutorials on each application are included. You'll be using CalKit like a pro, right out of the box. And once you've mastered the built-in templates, you'll be ready for your own unique spreadsheet programs.

Powerful solutions + ease of use + low low cost = CalKit. It all adds up to exceptional value, for a computer program that can help you every day.

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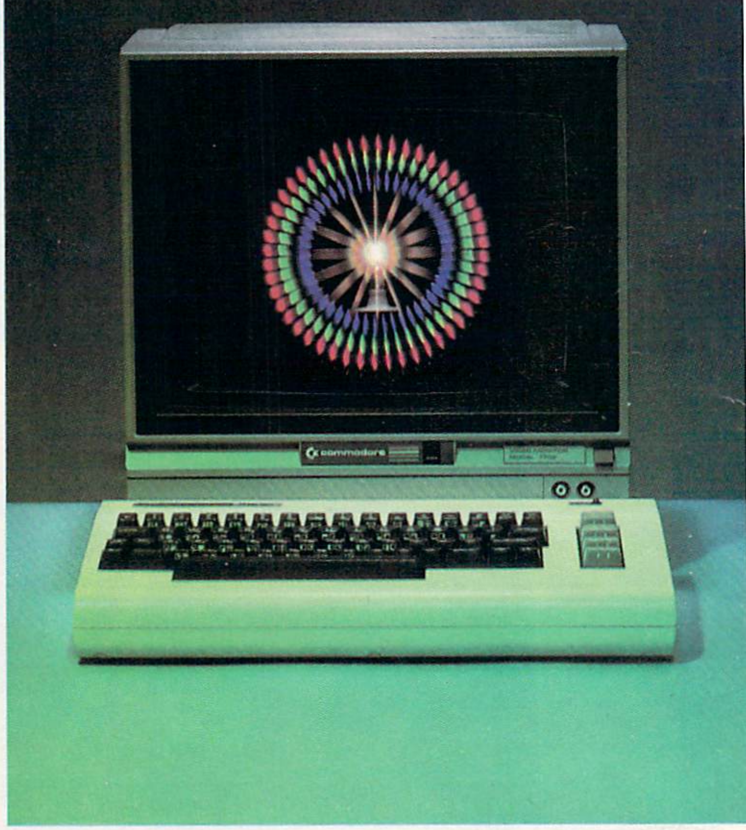
WRITE FOR A FULL COLOR BROCHURE

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USA 92714

TELELINK

The smart way to go online

Shortly after learning my way around one of the major information networks, I realized that I needed more than just a dumb terminal program. I needed a program that would store the incoming information so I could scrutinize it at my leisure. The program should be able to review the information, edit it, and save parts or all of it as individual files. I thought it would be nice if you could then take those files and append them as well. It should have a generous buffer which could be controlled while in the terminal mode and which would warn you when it was almost full. The speed of machine language would be a necessity, as well as the ability to support a compatible printer. Of course, the program would have to be easy to operate and have the ability to be expanded with features like auto-dialing, uploading, converting sequential listings to runable BASIC programs, or whatever else I wanted it to do. Most of all, it should be inexpensive, say under $10. Needless to say, I didn't find the terminal program of my dreams. So I wrote it—*Telelink 64.*

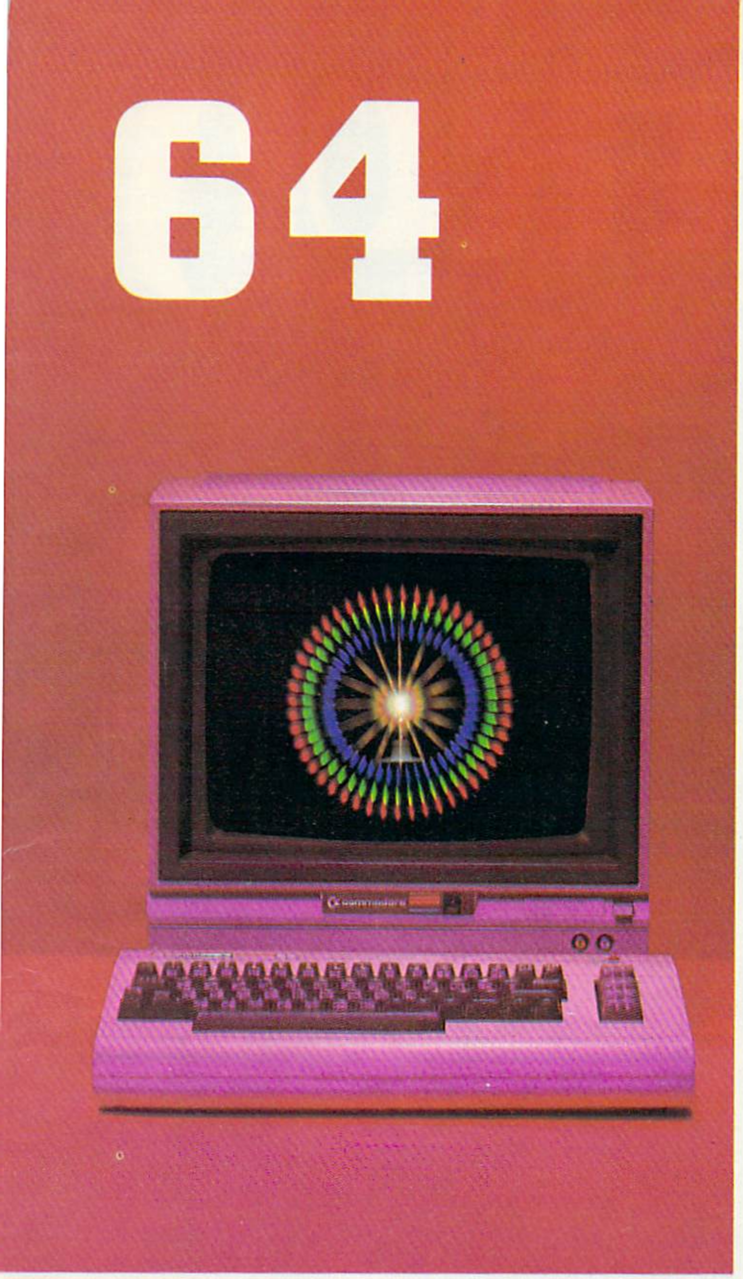


SPECIFICATIONS

Telelink 64 is a hybrid program. In general, menu display and menu selection are handled by BASIC while all the actual functions are performed in machine language. This provides for speed when needed, yet allows great flexibility for future additions. The program sports a 48.5K buffer which sounds a bell when it is within 256 bytes of being full. The terminal mode operates at 300 baud, full duplex and is suitable for operation with most major telecommunications networks. This program will work with Commodore's 1600 or 1650 modem or any compatible RS232 modem. Printer output is via the serial port and characters are transmitted to the printer using the nonstandard Commodore CHR$ codes. Information is stored and retrieved from either tape or disk.

ENTERING *TELELINK 64*

Since *Telelink 64* is a hybrid it will be entered into your 64 in two parts. The machine language portion will be entered first, using the *Flankspeed* program found elsewhere in this issue of *Ahoy!* Turn your computer off and then on again. LOAD the *Flankspeed* program and RUN it. When asked for the starting address, enter 1500 and press RETURN. Now enter 19FF as the ending address and press RETURN. Type in the *Flankspeed* listing for *Telelink 64* and when prompted, save it using the filename "ML64". End the *Flankspeed* program by pressing the RUN/STOP and RESTORE keys together. (If you wish to quit here and continue later, you can easily do so. When you return, turn on your computer and type LOAD "ML64",1,1 for tape or LOAD "ML64",8,1 for disk. Press RETURN and when it's finished LOADing continue from here.) Type NEW and press RETURN. Now type POKE 52,21:POKE 56,21 and press RETURN. You are now ready to type in the BASIC portion of *Telelink 64.* When you have finished, type POKE 45,1: POKE 46,26 and press RETURN. SAVE the completed program using the filename *Telelink 64* *before* you RUN it. Both the BASIC and the machine language portions will be SAVEd together. You should now be ready to use *Telelink 64* to connect with your favorite information service.



By Gordon F. Wheat

f5 – sends a Control Q
f7 – sends a Control S
f2 – turns the Receive Buffer ON
f4 – turns the Receive Buffer OFF
f6 – Resets and Receive Buffer
f8 – Exit Terminal to the Main Menu

In standard ASCII code, Control C (f1) and Control S (f7) are used to indicate a stop sending command. Control P (f3) is used to indicate a break, which exits the program the host computer is running. Control Q (f5) tells the host computer to resume sending.

Pressing f2 turns the receive buffer on. Once on, all text will be saved until you either turn off the buffer or the buffer fills up. A bell will sound when the buffer is within 256 bytes of being full. If it fills up, all subsequent text will be lost.

f4 turns the buffer off. No text will be saved when the buffer is off. It is important to note that the buffer will always be off when *Telelink 64* is first RUN.

Pressing f6 resets the buffer pointers to their base location. This will not cause any immediate loss of text; however, if the buffer is on it will begin to overwrite the previously stored text with the new incoming text. Be careful with this one!

f8 exits the terminal mode and returns you to the main menu.

It should be mentioned that *Telelink 64* has a limited ability to receive and store data, up to 256 characters, even if you are not in the terminal mode. Data stored this way will be instantly displayed on the screen when you enter the terminal mode, but will not be stored in the permanent buffer unless it was previously turned on.

USING *TELELINK 64*

When RUN, *Telelink 64* displays its main menu. Choose the mode you want to use from the main menu and press the appropriate number key to enter that mode. Most of the main menu choices will offer you a second menu. Choose the function you want as you did before, then answer any prompts.

Each of the six main menu modes is explained below.

1 TERMINAL – Chosen when you are ready to communicate with a host computer. It assumes the host computer has already answered your call and offered you its carrier tone, and that the telephone line is already connected to your modem (see your specific modem's operator's manual for more details).

While in the terminal mode the eight function keys have these uses:

f1 – sends a Control C
f3 – sends a Control P

2 SEARCH TEXT – Allows you to browse through text, previously stored or loaded, in the buffer. Hold down the space bar and the text will begin rapidly scrolling onto the screen. Release the space bar to stop the scrolling. Each time you enter the search text mode from the main menu the buffer will be displayed starting at the beginning. You may skip ahead in the buffer or continue where you last stopped by using the function keys.

While in the search text mode the function keys have these uses:

f1 – Start Selected Text
f3 – End Selected Text
f5 – Back up Display of Buffer
f7 – Slow Scroll
f2 – Display Selected Text
f4 – Continue from Start of Selected Text
f6 – Skip Ahead in Buffer
f8 – Exit to Main Menu



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f1 and f3 are used to mark the start and end, respectively, of the selected text. Use them to define portions of the buffer which you want to save to tape, disk, or printer as individual files.

f5 is used to back up the display of the buffer. This is especially useful when choosing the start or end of the selected text.

Press f7 to scroll slowly through the buffer. This function is also useful for choosing the start or end of the selected text. Release f7 to stop the slow scroll.

Use f2 to display the selected text that you have chosen. After pressing f2, use the space bar to scroll through the selected portion of text. Then use f8 to return to the search text mode.

f4 is used to continue the display of the buffer, from the beginning of the selected text, after you have returned to the main menu. Remember that each time you return to the main menu and then reenter the search text mode, the buffer will be displayed starting from the beginning. Use this function to skip all previously displayed text and continue from the point you marked as the start of the selected text.

Use f6 to skip ahead in the buffer display. This function skips approximately 256 bytes of text and will continue the display from that point.

f8 is used to exit to the main menu so that you can print or save the portion of the buffer which you defined as the selected text. f8 also will return you to the search text mode after viewing the selected text.

3 SAVE–Allows you to create text files which can be saved to tape or disk.

Upon choosing this mode, the Save menu will appear on your screen. The menu will offer you three choices:

1 Save All Text
2 Save Selected Text
3 Abort this Function

Choice 1 will save that portion of the buffer which you previously defined as selected text while you were in the search text mode.

Choice 2 will save everything in the buffer, regardless of the selected text.

After choosing one of the above save functions, you will be prompted to enter a filename. Type in the filename and press RETURN. You will then be asked if the save will be to tape or disk. Press T or D, respectively, and the save will begin. When it is complete you will be returned to the main menu.

Choice 3 will return you to the main menu. It will not abort a save once you have made choices 1 or 2 from the Save menu.

4 LOAD–Allows you to load previously saved text files into the buffer for review or printing.

The Load menu offers you two choices:

1 Load
2 Abort this Function

Press 1 and you will be asked for the filename. Then press T or D for tape or disk and the file will be loaded. You will be returned to the main menu when the load is complete.

This function will also append several text files into one master file. This can be done by resetting the buffer from the main menu and then simply loading several text files in sequence. They can then be saved as one master file by choosing the Save All Text option from the Save menu.

You can also overlay two or more text files. Set the end of selected text, while in the search text mode, to the place where you want the text file to begin loading in the buffer. It will then overwrite whatever is in the buffer from that point on, leaving all text before that point intact.

5 SAVE TO PRINTER–Choose this mode to send a portion or all of the buffer to a compatible printer.

The Save to Printer menu allows you to:

1 Print All Text
2 Print Selected Text
3 Abort this Function

Press 1 and all the text in the buffer will be printed out. This choice will rarely be used but is provided "just in case." Be aware that a full buffer could produce more than one hundred pages of printed text.

Press 2 and only the selected text will be printed. Choose your selected text while in the search text mode as explained earlier.

Press 3 to return to the main menu. Once again, this option will not abort a printout once it has begun.

6 BUFFER–This mode circumvents the need to enter the terminal mode to control the buffer and gives you direct control from the main menu.

The Buffer menu offers you these options:

0 Reset Buffer
1 Buffer ON
2 Buffer OFF
3 Abort this Function

Choice 0 resets the buffer and starts placing all incoming text at the beginning of the buffer. This includes text being loaded or text being received over the modem. Any text currently in the buffer will begin to be overwritten by the new incoming text (and therefore lost

Continued on page 98



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SHIP TO SHORE

The Latest on the Telecommunications Front

BY JAMES IRONS DAVIDSON

You've more than likely heard of the big three auto makers: Ford, General Motors, and Chrysler. There seems to be a parallel in the communications industry, as whenever the conversation turns to major networks or information services, just two come to mind for most people: CompuServe Information Services and, of course, the Source. These are the pioneers, the ones who started it all when it comes to bringing the vast resources possible on a major network to the general public and small businesses.

In much the same vein as there are competitors for the captains of Detroit, like American Motors and DeLorean (we know how well that one worked out), there are now competitors for your network access dollar. These folks think they've got a few good reasons why you ought to consider them in place of their better-known big brothers.

One firm with a little something different to offer, and perhaps a longer-lasting benefit than chatting with other people via modem or playing online games, is the Electronic University. That's correct–a university you can "attend" without leaving the comfort of your own home. Stoke up the fire, settle down with a nice hot cup of cocoa, and get back online for your degree.

The Electronic University is owned and operated by TeleLearning Systems, Inc. of San Francisco, California. The Chairman and founder of TeleLearning Systems, Ron Gordon, has a few other interesting accomplishments to his credit, among them the pocket language translator and hand-held computer. Not bad at all; kind of makes you wonder what he's got up his sleeve.

Perhaps today's kids will grow up going to school only in the sense that they turn off their homework program and boot up their access disk to a digital school somewhere off in the vast reaches of the American continent and type "Hi!" to their instructor, also a program. Big Brother seems to be looking over even the smallest shoulders these days. I for one am looking forward to taking one of Mr. Gordon's full courses so that I can make a more detailed presentation of what it's actually like to go to school without going farther than the keyboard of my Commodore 64.

One company planning to compete on the price front with CompuServe and the Source is Echo. They claim to be 33% lower than CompuServe and 60% lower than the Source in their connect charges. Echo's mainstay is their electronic mail and user conferencing functions. For just $10 a month, any Echo user may send as much Electronic Mail as he has time for and as much user conferencing as he is capable of arranging. Compared to the possible bills for such usage on other systems, Echo comes up roses.

Echo is also offering the kind of fare that people are used to on CompuServe: things like group bulletin boards online so that people with a given interest have a place to go, very much like the SIG's (Special Interest Groups) on CompuServe. There are also many online databases which are available to all users; or you may create your own set of data. An electronic Employment Listing Service, classified advertising, and electronic shopping will be online very soon (most likely by the time you read this column).

Echo believes that they have a lot to offer and a lot more on the way. Where else can you get such a wide range of features for $10 a month, no strings attached? Let's echo that–ten bucks for unlimited mail, chatting, and information. With price paramount in many American minds they may have what it takes to get the users they want and need.

You may begin to wonder just how many of these information providers, as they are now called, can coexist. For the answer, we can take a look at the long-distance telephone industry. Only months old, there are already hundreds (soon to be thousands if the pace keeps up) of companies supplying you with the service you want to call across the state or across the country. You can even have American Express act as your phone company. Can it be all that long before American Express offers services to allow card members to send Electronic Mail and chat with their computer-owning friends?

OEMI (Original Electronic Mailbox, Inc.), a Minneapolis-based company, has a few of the things you're reading about here, but have also added a twist to this standard lineup. You may find it quite remarkable to be able to tap into the power of a large network from your home, but what about when you're not at home? OEMI believes that their Pegasus system is the answer to both questions: a system you can use from the outside.

Let's say you drop into a hotel in Chicago or New York and decide you need to call into your network and

send someone an electronic memo, or see if you've got an answer to that software question you left with a friend in California who promised to get back to you "real soon." If OEMI has its way, you'll find the Pegasus system in the lobby. Sit down, punch in your access code, and you're online. I suppose these folks have seen one too many cash machines while strolling around Manhattan, but it is a great idea if they can pull it off. Can you imagine the fun of walking up to something like a pay phone and accessing your CompuServe (or Pegasus) account?

Each Pegasus station will have a telephone, a terminal, a facsimile machine (for transmitting images), and a printer so that you can do just about anything you normally do at home or in your office right from the hotel lobby, and maybe someday from the corner terminal. You know the one, right next to the news dealer who now sells floppy disks and computer paper.

All this may sound just a bit out of this world; however, there is one group who'd like to bring your thoughts to an even higher plane, or should I say an even higher space shuttle. You guessed it–NASA (the National Aeronautics and Space Administration) has got a Bulletin Board System for you to try out. This one is just for info on NASA missions and so on, and it's a long distance call, but if you feel like something a little different, they have just your cup of tea.

If you're the type who can't stand waiting to find out what's going on in orbit, and the news is not on, you've got to give the NASA folks a buzz. You can even find out about that alltime favorite of the folks at *Ahoy!*, the Getaway Special...that's how we get to all the trade shows so quickly. To find out how Bob, Dave, Morton, and all the folks here manage it, just call 301-344-9156 with your modem and you can wallow in the piles of space-age info.

If you know of an interesting or unusual telecommunications application or a really great Bulletin Board System with a terrific sysop, you might want to drop me a line here at *Ahoy!* so we can let the world know about it. Keep on dialing and use your machine to its fullest. Ahoy! ☐

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An Introduction to

The communications revolution that started with the telephone has invaded the home computer realm, creating an information revolution. What the telephone did for people, the modem does for computers. Originally used to connect large mainframe computers, modems have now fallen into the price range of home and personal computerists.

Large information services, like CompuServe and the Source, provide the latest news, weather, or sports—24 hours a day. Individuals who formerly had to subscribe to a wire service like AP or UPI and have special equipment to receive the latest information can now get it through their home or personal computer. These services also provide electronic shopping malls, encyclopedias, book and software stores, banking by phone, and even an electronic postal service. In twenty minutes, a letter "mailed" via CompuServe is in the recipient's "in box."

For those just starting to use a modem, though, these information services can be both confusing and expensive. At $6.00 to $7.50 an hour, mistakes in using your newfound toy can get costly. Too bad there isn't a local, smaller version of these services that you can cut your teeth on.

Introducing—the local electronic bulletin board system (BBS). Found in most towns or cities with a computer population larger than a couple hundred, they are independently owned and operated by computerists just like you. Unlike the larger information services which can handle hundreds or thousands of users simultaneously, a local BBS is usually a one user at a time system. Since most BBS's have under a hundred users who sign on regularly, there isn't that much of a wait to get on.

Before getting on a board, you should know a few things about how they work. An electronic BBS is a program running on a home or personal computer with a modem. The program keeps track of who called, how long the caller stayed on the line, what he did while he was there, and what messages are entered, and in some cases decides whether the caller has the right to use the board.

Many BBS operators (called SYSOPS, or system operators) keep track of who they allow to use their computer. To do this, a SYSOP may require potential users to leave their name, address, and telephone number. SYSOPS frequently assign users a password so each is accurately identified. This prevents troublemakers from calling and using someone else's name while they cook up problems for the SYSOP.

Most BBS's are run by computerists who want to help others. Even those that charge a sign-on fee rarely make any money. Besides using electricity, 24-hour BBS's eat up disks at the rate of a dozen or so a month. A separate phone line is usually installed for the bulletin board and disk drives and modems are always breaking down. Some really nice boards have hard disks allowing them to hold more information. The sign-on fees never cover the cost of running the board. Frequently the $5 or $10 fee is used to screen out potential misusers.

Not all BBS's run 24 hours a day. Many are put on line only in the evening and early morning. Others are sharing a line with the regular phone and require users to call, let the phone ring once, then hang up and call back. The computer answers on the second call.

How do you find boards in your area? Try contacting local users groups. Anyone who has a modem can probably tell you at least one board you can get on. If all else fails, ask someone at the store where you buy the modem. The store may even be running a BBS.

While finding boards to explore, you'll need to find out a few other things to actually get connected. Computers aren't great conversationalists. When trying to get two of them talking, you must make sure they are talking the same language. The software that each computer runs (usually called a terminal package) has certain switches that must be set. You need to know how these parameters are set for the computer you are calling. (See *BBS Parameters,* this page.) Most BBS's can be contacted if you are set to 300 baud, full duplex, 7 bit, no parity, 1 stop bit, X-On/X-Off protocol.

What to do when you get there? Most boards have some kind of sign-on procedure. Besides helping the SYSOP keep track of who's been there, each message is stored with the author's name so others can reply.

Once you're on, look around for a section that lists other BBS's in the area. Almost all boards carry such a list and frequently include both local and national boards. Some computer magazines carry lists of the BBS's whose existence they can verify. These listings are usually in numerical order by area code, making it easy to isolate local ones.

LOCAL BULLETIN BOARD SYSTEMS

By Cheryl Peterson

Most BBS's also allow users to send private messages to each other. Without knowing the identity of users, this becomes next to impossible. These messages are generally referred to as mail, electronic mail, or EMAIL. It may seem easier just to give your friend a call by voice phone, but an electronic message will wait until someone retrieves it. If you've ever spent three days trying to get a message to someone and then waited another two days to get the reply, the advantages of EMAIL are apparent.

You drop a "letter" in a friend's electronic mailbox. The next time he signs on and reads his mail, he gets it and automatically posts a reply. You sign on later and pick it up.

The public message space is usually the most interesting place. You'll see new users seeking help with their computers, hackers discussing their latest software modifications, debates on every subject imaginable, other users trying to buy or sell used equipment, and/or comments about the latest software packages on the market. You may even run into a great recipe for Piña Coladas.

Another popular area is the download section. Here, public domain programs can be transmitted from the BBS to your computer. A list of programs and a short description of each lets you know what's available. Somewhere nearby, probably disguised as a HELP option, there may also be instructions on how to perform a download.

If there's a problem getting the program, the SYSOP may give you a hand directly. If the board has a chat function, he may type in some instructions for you. Unless he's standing by and notices you're in trouble, though, you'll have to initiate a chat to get his attention. Usually there's a command that will ring a bell to signal the SYSOP that he's needed. CHAT allows the SYSOP to communicate directly with users by typing on his computer's keyboard. (I'll bet you thought you were going to get to talk with him!)

There's a big difference between public domain software and the copyrighted programs that are sold by software manufacturers. Beware! There are fly-by-night BBS's that offer copyrighted programs in their download sections. Obtaining these "pirate" programs is illegal. If you see a program name you recognize from advertisements, it might be best to ignore it.

On the other hand, PD programs have been written by programmers who, for one reason or another, don't wish to sell them. Instead they give the programs away, to be copied freely by anyone who can use them.

You may also see "user-supported" programs, which are being distributed by authors who don't want to conscientiously market them. These programs contain a copyright notice and encourage users to send money to the author if the program proves useful. There is usually an address and telephone number where the author can be reached. Provided you have registered the program (usually by sending some money) the author will assist you with problems you encounter.

Some authors are choosing to sell their programs this way because it means they do not have to advertise, print up documentation or fancy packaging, copy diskettes or tapes, or hire support staff to help users get comfortable with the package. Since the programs and documentation are available on BBS's around the country, the authors get maximum exposure with minimum labor. And they ask for only a small amount of money in return. Instead of selling their programs for hundreds of dollars, they frequently ask for a "donation" of $35 to $100.

Many boards are identified as RCP/M's. These BBS's have mostly CP/M software and won't be of much use to Commodore users who don't have a CP/M module. Those who frequent RCP/M's usually own personal computers rather than home computers. These machines have so little in common with the 64 and VIC that useful advice will be slight.

There is much to be gained from joining a local bulletin board or two, from cozy companionships to enlivening debate, from hardware and software hints to working programs. Local BBS's have it all. And don't forget to drop the SYSOP a note of thanks once in a while. □

BBS PARAMETERS

Here are some parameters you might see in a listing of bulletin board systems. If you look in your modem software documentation, you will probably find a menu where these parameters can be changed. These are some of the typical options available.

Baud rate	300/1200
Duplex	Full/Half/Simplex/Echoplex
Word Length	7 bit/8 bit
Stop Bits	1/2
Parity	No/Even/Odd/Mark
Protocol	Null
	X-on/X-off
	Modem
	Break/Return

Modems



Making an *Intelligent* First Purchase

By David Barron

We're not out to insult anyone's intelligence. We know that many of you are wise in the ways of modems, and could write this introduction as well as we. But we're thinking of those readers who, regrettably, have not yet joined the telecommunications generation and, still more regrettably, must miss out on the special telecom features in this issue of *Ahoy!* (And we're thinking of you sophisticated telecommunicators, too—because you're liable to pick up a fact or two if you read on.)

Commodore computers use two basic types of modems. For a great many users, all that is needed to venture into telecommunications is the type of modem that plugs directly into the back of the computer. This type is generally not intelligent (see below) and operates at low speeds, but is significantly less expensive than the second type, which attaches to the computer by means of an RS232C interface. To use this second type of modem, you must first purchase the interface, which plugs into your computer just the way the other type of modem would. Your modem connects to the interface via a cable. Generally, these modems are intelligent, durable, and more expensive.

Following are some of the terms you may encounter while shopping for a modem:

Intelligence: modems may be further divided into those that are intelligent and those that are not. The intelligent type typically communicate through the RS232C port, and are controlled by the commands you send. They will usually dial and answer a phone automatically, as well as provide additional features to be discussed below.

Direct-connect/Acoustic: in today's marketplace you'll find mostly direct-connect modems. These, as their name implies, connect directly to the telephone line, via a modular plug. Acoustic modems have two cups on top of them designed to accommodate a telephone handset. Direct-connect modems offer the advantage of ease of use and better-quality connections. (Currently, the only practical use for acoustic modems would be with pay phones.)

Autodialing: most intelligent (and some non-intelligent) modems will dial the telephone for you. They do this through either pulse or tone dialing. These modems will dial a number and wait for a computer to answer the phone. When a computer answers it will send a carrier (a high-pitched tone); at this point your modem will respond with its own carrier, establishing a connection. Intelligent modems are told to dial by sending them a command line such as ATDT 1-212-555-1212. To a Hayes smartmodem (or compatible), this would mean "dial 1-212-555-1212 using touch tones." In order to take advantage of the autodial feature found on non-RS232C modems, you must use special terminal software designed for your particular modem.

Autoanswer: most modems that feature autodial will also provide an autoanswer function. This enables your computer to automatically pick up the phone when it rings and send a carrier. This could be useful if you plan to set up a bulletin board system. Additionally, some telecommunications services will call your computer at predetermined times and send reports. This service, along with an autoanswer modem, could enable you to read the latest UPI headlines with your morning coffee.

300/1200 Baud: most non-RS232C modems operate at 300 baud, or approximately 30 characters per second. This is the most commonly used speed for microcomputers, and is supported by virtually all modems. Some more expensive, intelligent modems also communicate at 1200 baud (or 120 characters per second). I would recommend a 1200 baud modem only to users who plan to do a great deal of file transfer; otherwise, it is simply a novelty.

Intelligent modems may have other features that I have not mentioned. These include clocks to time calls, buffers to store information, and status lights for diagnostic purposes. Some even store phone lists so that you can dial a system simply by keying in a name. Some autodial modems recognize a busy signal and will redial forever until they get through to the system.

I've mentioned most of the features you'll have to consider when shopping for a modem. Remember to think towards the future, and be sure of what you need (and don't) before making that final decision. ☐

FONTASIA

A PRINTER FORMAT PROGRAM FOR THE VIC AND 64

BY JOHN C. LAWS

Have you ever tried to change the parameters of your dot matrix printer? After searching through the printer and interface manuals and with some experimentation, you probably achieved your goal; but how much time did it take? I wrote this program to do it for me quickly.

To talk about printers you must also talk about the interfaces that connect the computer to the printers. I will lightly cover the Epson RX-80 F/T and Star Micronics Gemini-10X printers, since they have about the same capabilities and are two of the most common home printers. I will also touch on the Card/?+G and Tymac Connection interfaces.

Either interface will make either printer emulate a Commodore printer. Each interface also has a transparent mode that allows you to tap the other special features of these printers. The program I wrote won't cover all the special features, but will allow you to access the most commonly used features. You will be able to change the printer to either Elite, Condensed, Italics, or Enlarged character sets, with or without emphasizing or double striking. Of course, on power up you get the Pica character set. You will be allowed to set different line spacing, left margin, skip over perforation, and form length, and ignore the paper end signal. The other features are best manipulated from within a program of a specific use (i.e. super/subscript, tabs, skip position, etc.).

Of the fourteen parameters that you can change, only three codes had to be changed to work with the two different printers and one of them was due to the interface. The Card/?+G interface worked best in the emulate mode. I had to change to the transparent mode once, because that was the only way I could send the proper code to change the left margin parameter. The Connection interface worked best in the transparent mode. The Connection interface worked best in the transparent mode. In emulate mode you have to send two escape codes—CHR$(27) twice—because the interface stops the first one.

The program listing is for the Epson printer hooked up with the Card/?+G interface. I will give you the Star/Connection line changes below with some possible fixes for the mixed combinations of the four. Lines 10- 120 are the screen menu with input. Line 130 opens the printer channel (emulation mode with line feed) and directs the program to the proper code that is sent to the printer.

Lines 140-180 gives you the option of combining two parameters, changing what you have just done, or ending the program. Turn the power off to the printer to reset it.

Line 200 initiates the Elite character set. This is one of the non-transferable codes to the Star printer. Line 250 initiates the Condensed character set. You send a CHR$(20) code, but the interface changes it to a (15), which is the same for the Star. Line 300 initiates the Italics alternate character set. Line 350 puts the printer in Emphasized (near letter quality) mode. You can Emphasize the Pica, Elite, Italics, and Enlarged character sets.

Line 400 initiates the Enlarged character mode. You can Enlarge the Pica, Elite, and Condensed character sets. Line 450 puts the printer in Double Strike mode. Lines 500-590 offer you the option of changing the vertical line spacing to one of three other standards or anything in between.

Lines 600-610 allow you to change the left margin. This is the other code we must change for the Star printer. Line 650 tells your printer to ignore the paper end signal. This will let you use single sheets much more easily and quietly. Lines 700-820 allow you to change the page length by either the number of lines per page or by inches. This is useful for custom forms and the like. Lines 850-870 let you skip over the perforation on your continuous pinfeed paper and leave as many blank lines at the bottom of the page as you wish.

The changes for tho Star/Connection combination are as follows: in line 130 change the open statement to OPEN4,4,6. This puts the interface in its transparent mode. In line 200 change the code to CHR$(27); CHR$(66); CHR$(2);. In line 250 change the CHR$(20) to CHR$(15). Delete line 605 and in line 610 change the CHR$(108) code to CHR$(77).

For the Star/Card/?+G combination try leaving the program in the emulate mode (OPEN4,4,0) and change the codes in lines 200 and 610. For the Epson/Connection combination change the open statement in line 130 to OPEN4,4,6 and in line 250 change the CHR$(20) code to CHR$(15).

If this fails, first change the emulate/transparent modes. In that fails to work, go through the manuals one last time, check your codes, and see if all the dip switches in the interface and printer are set correctly.

If you have another brand of printer or interface, just place the proper codes in the proper lines and you will be in business. If your printer does not have all these features, this program will not create them for you.

Fontasia will work on both the C-64 and VIC 20. However, the following changes must be made in the program to make the menu display correctly on the VIC 20 screen:

Line 10: change SPC(7) to SPC(4)
Lines 20-105: remove all SPC(9) and [DOWN] commands
Line 107: remove SPC(9)
Line 110: change SPC(10) to SPC(5)
Line 150: remove [RIGHT]
Lines 500-502: remove all SPC(9) commands
Line 510: remove [RIGHT][RIGHT]
Line 600: change SPC(15) to SPC(5)
Line 700: remove RIGHT
Lines 710-800: remove all SPC(9) commands

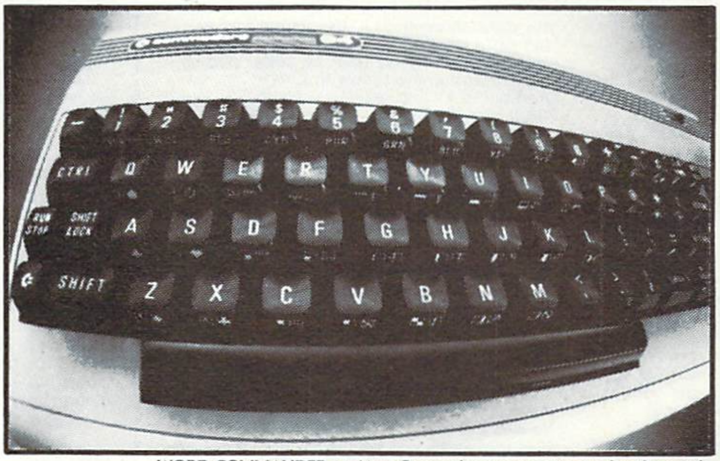
The *VIC 20 Bug Repellent* Line Codes printed after the program, on page 81, reflect the above changes. (The codes listed alongside their respective program lines on pages 79 and 81 are for the C-64 only.) □

SEE PROGRAM LISTING ON PAGE 79

The *Bug Repellent* Line Codes printed alongside the program on pages 79 and 81 are for the C-64. The VIC 20 codes follow the program listing, on page 81. (Or order *Ahoy!*'s program disk or cassette and forget about debugging—and typing! Details on page 80.)

For The C64

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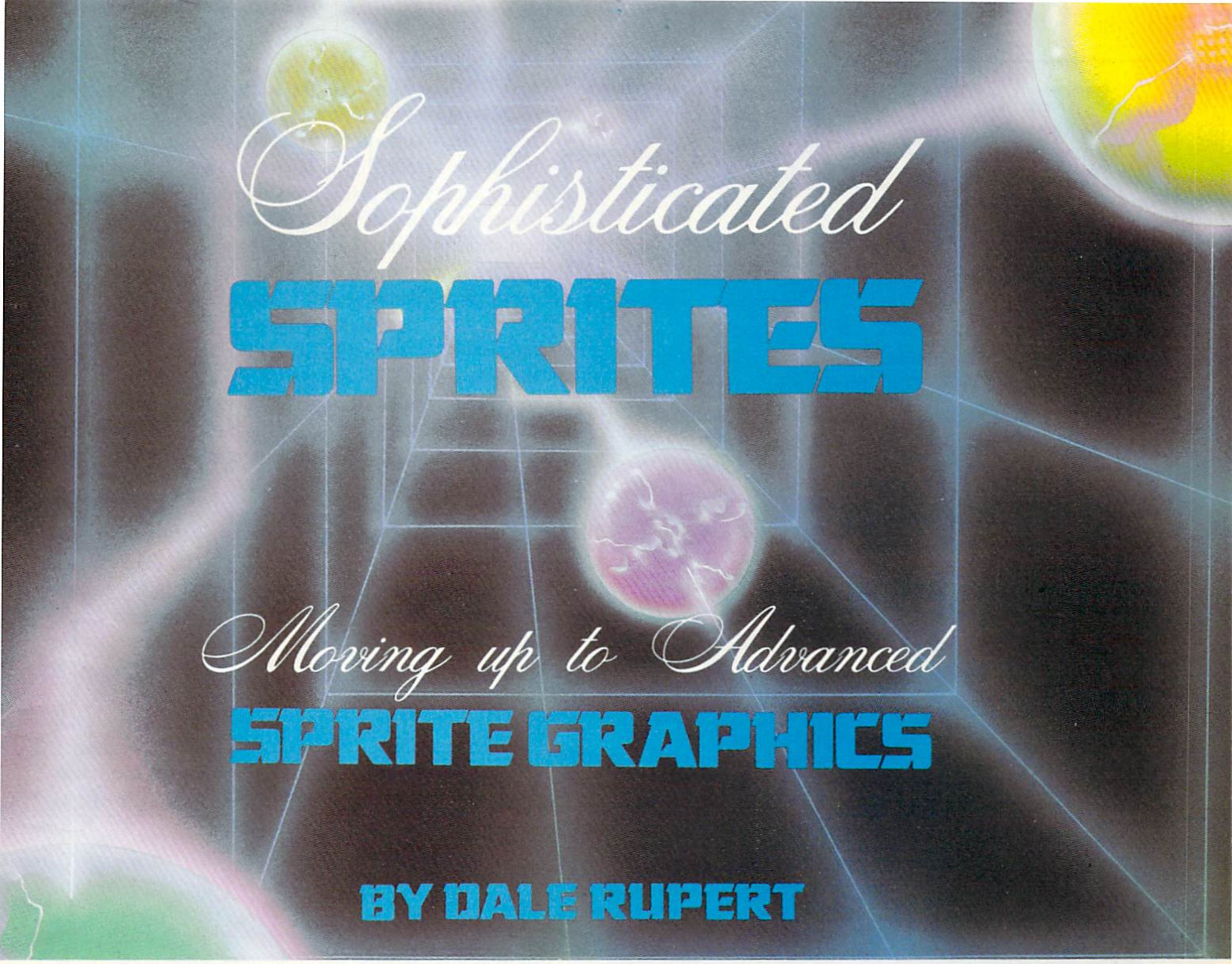
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Sophisticated SPRITES

Moving up to Advanced SPRITE GRAPHICS

BY DALE RUPERT

There are two breeds of sprites. Last month we discussed the high-resolution sprites; this month we will study the multicolored sprites. We will also investigate some additional aspects of both types, including expandability and collisions. We will also have a look at binary arithmetic. The task of creating and using fantastic sprites will be left up to you. This article and the previous one provide the utilities to help simplify the task.

First, a quick overview. A sprite is a graphics object which is defined by the data in a specific block of RAM. Once the basic appearance of the sprite is defined, other characteristics such as its screen location, color, and magnification may be specified. Also, it is possible to determine if a sprite is currently colliding with (or overlapping) any other sprites or background objects.

The various parameters defining a sprite are written to the registers of the sophisticated VIC-II (Video Interface Chip). Thirty-four of the VIC-II's forty-seven registers are used for sprite information. The registers are numbered from 0 to 46. They are updated in BASIC by POKE statements to address 53248 plus the register number. For example, if V=53248, then POKE V,1 puts a 1 into register 0, and POKE V+46,255 puts a 255 into register 46.

The data which defines the shape and color characteristics of a sprite may reside almost anywhere in RAM. The best places are in the cassette buffer, if three or fewer sprites are being used, or in memory above BASIC program storage for more than three sprites.

Each sprite definition requires a 64-byte block of RAM. The VIC-II chip communicates with only a 16K bank of RAM at a time. Consequently the VIC-II may access 256 possible 64-byte blocks within the current bank of RAM. There are four 16K banks within the Commodore 64's address space. Chapter 3 of the *Programmer's Reference Guide* shows how to change the memory bank being used. We will assume that bank 0 (the default) has been selected.

There may be as many as eight sprites, numbered 0 through 7, defined at a time. We must establish a block pointer to each sprite's RAM data location. The VIC-II chip reads address (2040 + N) to get the pointer to sprite N's memory location. The block pointer (call it BK) is a one-byte quantity between 0 and 255. The address it points to is given by (64*BK). For example, if the VIC-II finds 100 stored in location 2040, it assumes the data for sprite number 0 begins at location 6400. A 20 in location 2047 indicates that the data for sprite number 7 begins at address 1280 (since 20*64 = 1280).

MAKING COLORS

The VIC-II may interpret the sprite data in the specified memory location in one of two ways. Both the high-resolution and the multicolor sprites consist of a rectangular image on the screen that is normally twenty-four pixels wide and twenty-one pixels high. Three 8-bit bytes define each horizontal line of both types of sprites. A high-resolution sprite is composed of two colors, the sprite color and the background color. Each pixel within the 24 by 21 array may be individually specified.

The multicolor sprite may contain four colors at the expense of lower resolution. Each horizontal pair of pixels may be defined as being one of four colors. Two of the colors, sprite color and background color, are the same as for the high-resolution sprites. The other two possible colors are referred to as multicolor #1 (MC#1) and multicolor #2 (MC#2).

The two colors chosen for MC#1 and MC#2 are shared by all multicolor sprites. The sprite color may be picked for each sprite individually. The background color is not really a color. It is more accurately a state of transparency. Any parts of the sprite having the background color will actually show whatever is on the screen behind them. It is, however, convenient to refer to it as the background color.

With high-resolution sprites, each bit which is a "one" corresponds to a pixel with the sprite color, and each bit set to a zero corresponds to a pixel with the background color. With multicolor sprites, each pair of bits forms a code according to this table:

00	background color
01	multicolor #1
10	sprite color
11	multicolor #2

For example, assume the first three bytes in the memory block assigned to sprite 0 are 27, 165, and 198. We can determine the colors along the top row of that sprite by interpreting the binary (base 2) representation of those numbers, just as the VIC-II chip does. Let's go through the process.

ONES AND ZEROES

Each 8-bit byte in memory corresponds to a value from 0 to 255. Zero is stored as 0000 0000, and 255 is stored as 1111 1111. (The space between the two groups of digits is for readability.) The leftmost bit represents 2 to the 7th power (128) and the rightmost bit represents 2 to the 0th power (1). If we number the bits from left to right as 7 through 0, the bit number tells the corresponding power of 2 which that bit represents. The decimal value of the binary number 1010 0110 may be calculated as follows. Starting at the left of the number, we simply add up the value of each bit which is set to 1. Our result looks like this:

```
2^7 + 2^5 + 2^2 + 2^1 = 128 + 32 + 4 + 2
= 166
```

We are using the notation that 2 ^ n means "2 raised

Continued on page 58

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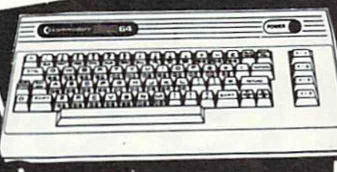
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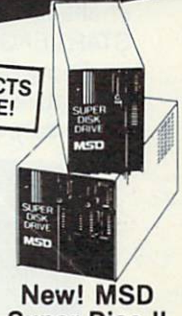


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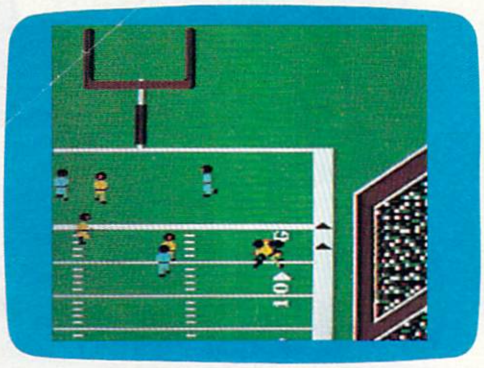
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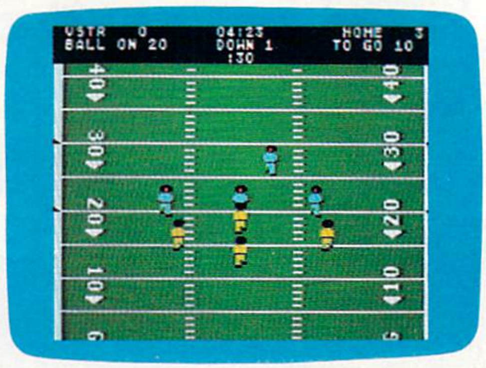
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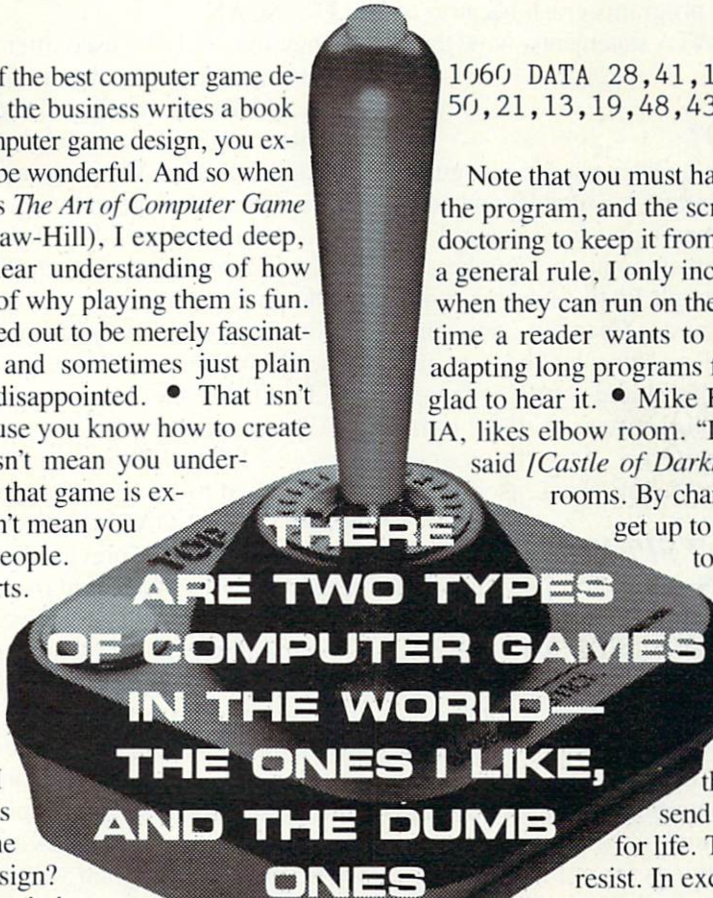
WE BRING SPORTS ALIVE

Reader Service No. 183

HOW DO GAMES PLAY?

BY ORSON SCOTT CARD

When one of the best computer game designers in the business writes a book about computer game design, you expect it to be wonderful. And so when I bought Chris Crawford's *The Art of Computer Game Design* (Osborne/McGraw-Hill), I expected deep, perceptive insight, a clear understanding of how computer games work, of why playing them is fun. And when the book turned out to be merely fascinating but often shallow and sometimes just plain wrong-headed, I was disappointed. • That isn't fair. After all, just because you know how to create an excellent game doesn't mean you understand, consciously, why that game is excellent. It certainly doesn't mean you can explain it to other people. • Those are different arts. Creation and criticism come from different places in your head, and require different ways of looking at things. So why would I be disappointed that Chris Crawford's book isn't the final word on game design? It's a first word, and that's better than nothing. In fact, it's pretty good.



LET'S NOT LEAVE WELL ENOUGH ALONE

Before I launch into a full review of the book—and my arguments with Crawford—let's get some old business out of the way. Those of you who have been following this series of articles might remember two recent installments on adventure gaming. The first part was a simple program that set up room direction tables to allow a player to "move" through the Castle of Darkness. The second part introduced many other commands and became a complete—though admittedly small and simple-minded—adventure game.

Two readers have responded to *Castle of Darkness*, the first part. Thomas Dildine of Waterloo, NY, adapted the program to run on the VIC by changing the keypress code table at line 1060:

```
1060 DATA 28,41,14,9,51,18,12,52,35,
50,21,13,19,48,43,30
```

Note that you must have an expanded VIC to run the program, and the screen display will need some doctoring to keep it from being a complete mess. As a general rule, I only include sample VIC programs when they can run on the unexpanded VIC—but any time a reader wants to go through the process of adapting long programs from the 64 to the VIC, I'm glad to hear it. • Mike Kallhoff of Guthrie Center, IA, likes elbow room. "I'm stuck!" he writes. "You said *[Castle of Darkness]* would hold up to 49 rooms. By changing line #310 a little, I can get up to 89 rooms. I want to be able to change it to read 160 rooms, BUT I CAN'T! Please, *HELP ME*!!!" Ordinarily we would cast such a supplicant to the wolves—what care we about his obvious desperation? But then he promised that if we send an answer, he'll be a reader for life. The temptation is too great to resist. In exchange for a few simple bits of information, *Ahoy!* can own Mike Kallhoff's soul. No matter what else happens, we can tell advertisers, "Hey, circulation may have its ups and downs, but we have Mike Kallhoff as a reader *for life.*"

So here it is, Mike. With these few program alterations, you can adapt *Castle of Darkness* to allow not a mere 160 rooms, but a walloping 244 rooms. We are nothing if not generous. And even though we own it, we promise not to sublet your soul.

Line 10 should be changed to:

```
10 DIM RD(244,8),CW$(16),RN$(255),RC(245
),KS(64)
```

Then, in line 310, change IF PR>49 to IF PR>244. In line 985, change the number 55 to 250. In the Room Direction Table in lines 1100 to 1175, add 195 to any number (except line numbers, of course) over 49, so that

Continued on page 92

Light fires! Full steam ahead!... with *Ahoy!*'s Machine Language Entry Program

FLANKSPEED

By Gordon F. Wheat

No longer will you miss out on great machine language programs because you don't have a machine language monitor or assembler, or because you don't understand machine language. No longer will your programs crash because of mistakes in a mountain of DATA statements. Now there is *Flankspeed* for the C-64.

WHAT DOES IT DO?

Flankspeed will allow you to enter machine language programs without an ML monitor or assembler and without any mistakes! The machine language is entered via *Flankspeed* using hexadecimal notation (numbers 0 through 9 and letters A through F) to save you many keystrokes. Don't worry, you don't have to know anything about hexadecimal or machine language to use *Flankspeed*. Type it into your 64 and SAVE it to tape or disk. It will be used in future issues of *Ahoy!* to insure mistakeproof ML program entry. Type the program in carefully; there is no way it can check itself.

HOW TO USE *FLANKSPEED*

When *Flankspeed* is RUN it asks for a starting and ending address. These values will always be given at the beginning of the *Flankspeed* listing. After entering the starting and ending addresses from the listing, the program will display the starting address as a prompt. It now expects you to type in the characters, following the address, from the *Flankspeed* listing. There is no need to type in the spaces between the characters or to hit the carriage return at the end of the line; *Flankspeed* will automatically do these things for you. If you complete a line that contains a mistake, a bell will sound and the program will prompt you to reenter that line. Use the delete key to back up and correct mistakes within a line, before it is finished. *Flankspeed* will know when you have completed the ML program and offer to SAVE it for you. The completed ML program, once SAVEd, can be LOADed from BASIC using the command LOAD "program name",1,1 for tape or LOAD "program name",8,1 for disk. You will then SYStem to the decimal address given at the beginning of the *Flankspeed* listing or RUN the program, whichever happens to be indicated.

If you have an ML monitor and prefer to use it, the *Flankspeed* listing is still for you, since it is actually a hexadecimal memory dump of the ML program. Just omit the last byte, which is the checksum used by the *Flankspeed* program. Then, follow the directions for your particular ML monitor to SAVE the program.

FUNCTION KEYS

F1–SAVE
F3–LOAD
F5–CONTINUE FROM ADDRESS
F7–SCAN

They may only be used after the starting and ending address prompts have been answered.

F1 SAVEs the machine language you have entered to tape or disk. This is useful when you don't feel like entering the entire ML program in one sitting. Press F1 on a new line prompt and you will be asked for the filename. You are then asked if the SAVE will be to tape or disk. *Flankspeed* will then SAVE your ML program so that you can continue it at your leisure. Remember the line number where you stopped so that you can continue from that point later.

F3 LOADs the ML program that you previously SAVEd. It will then offer the starting address as a prompt. Now use F5 or F7 to proceed.

F5 is used to continue from a new address. Use this function, after LOADing a SAVEd program, to continue from the line you previously stopped on. Always use an address from the *Flankspeed* listing, otherwise the program will not accept the lines you enter. Be careful! *Flankspeed* will not check any lines which you skip over using this function, so make sure you resume at the same line you stopped on.

F7 is used to scan through the program. This is useful when you just can't remember the line you were on when you SAVEd the incomplete ML program. Enter the address you want the scan to begin at and press RETURN. The program will produce a listing exactly like the *Flankspeed* listing except that the last character pair in each line will be missing. Press F7 again to stop the scan. Compare the *Flankspeed* listing to the listing produced by the scan to find out where you stopped. Now use F5 to continue from the proper address.

They may sound complicated, but don't let the function keys bother you. They are really quite simple to use. In fact, they are only used when the ML program is entered in more than one sitting.

OVERLAY

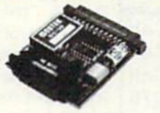
As an added aid, a second program is included (see page 62) which will print an overlay to place over the function keys. The overlay identifies what each function key does and is great for quick reference. The overlay will fit into a cassette box with the program tape or slip into a disk sleeve for easy storage. □

SEE PROGRAM LISTING ON PAGE 61

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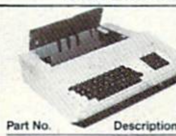
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REVIEWS

❶ Disk interface board (redesigned version of 1541's) includes an on-board processor and uses a serial communication system to pass data between the disk drive, the main processor, and the memory board.
❷ Switched mode power supply unit drives system's internals. Rear panel acts as a heat sink.
❸ Loudspeaker provides user with output from SID chip.
❹ Single 5¼" drive retains the head-alignment problems of the 1541.
❺ Five-inch tube is shielded against stray magnetic fields.
❻ Main processor and memory board are based on C-64, but all I/O functions have been separated to their own daughter boards.
❼ I/O board provides all peripheral interface functions. Two 6522 PIO chips serve user port, serial interface, joystick ports; cartridge port is connected to address and data busses.
❽ Cartridge port socket.
❾ Volume, color, and contrast controls, plus reset button.
❿ Keyboard casing forms lid of unit.

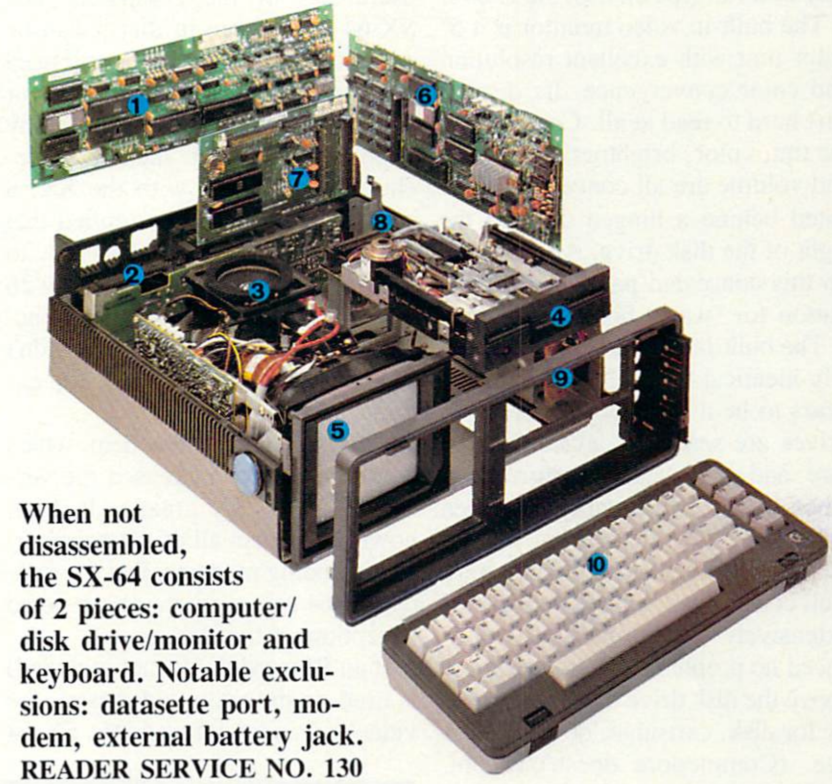


Photo: Ian McKinnal

When not disassembled, the SX-64 consists of 2 pieces: computer/ disk drive/monitor and keyboard. Notable exclusions: datasette port, modem, external battery jack.
READER SERVICE NO. 130

SX-64 PORTABLE COMPUTER
Commodore Business Machines
$995.00 (see below)

What weighs about 26 pounds, is slightly larger than a briefcase, and has a disk drive, color monitor, and 64K all in one package? If you answered the Commodore SX-64 Executive Portable Computer, you're right. When it comes to computing, you *can* take it with you!

Essentially, the SX-64 is the same as the stay-at-home C-64, with a few noticeable differences. The first, obviously, is Commodore's integrating the single disk drive and color monitor into the same cabinet, rather than cable-connecting these peripherals. The second is the total absence of the cassette port—if you intend to use a non-Commodore printer whose interface relies on this port for its operating voltage, you'll have to use an alternate hookup (see sidebar, next page). The third difference is the detachable keyboard which features a red LED on the shift-lock key to remind you when you're in the SHIFTed mode. Also, unlike the standard C-64's dark blue and light blue screen, the SX-64 uses dark blue letters on a white background with a cyan screen border. This change was made to increase legibility on the built-in 5" monitor, and to very good effect. The final major difference is the provision of a "check mark" symbol at the shifted " @ " position, instead of the graphic character found on the standard C-64.



Regarding physical configuration, placement of the controls and various ports was well thought out. The dual joystick ports, serial port, audio/ video port, on/off switch, and user port are all on the back of the unit (the bottom when in transit). The cartridge port is on the top (the side in transit), and protected by two spring-loaded doors that keep foreign objects out. Unfortunately, there is no provision for protecting the ports located on the back of the unit, which become quite vulnerable during transport. Perhaps some third-party manufacturer will market a snap-on cover for the SX.

The keyboard connects to the computer itself via a cable with D-25 connectors on both ends. When not in use, the keyboard snaps on to the front (top) of the SX, thereby protecting the monitor and disk drive as well as providing a lid for the unit. The "touch" of the keyboard is very

light, and after a short period of getting used to it, I found it considerably faster to type on than the C-64's.

The built-in video monitor is a 5" color unit with excellent resolution and color convergence. Its display isn't hard to read at all. Controls for the tint, color, brightness, contrast, and volume are all conveniently located behind a hinged door to the right of the disk drive. Also located on this concealed panel is the reset button for "warm boots."

The built-in disk drive is functionally identical to the 1541, but it appears to be a half-height unit. Disk drives are sensitive devices by nature, and don't usually perform well when jostled and bumped, as when in transit. The disk drive on the SX-64, however, is apparently very well constructed, since I've traveled extensively with mine and experienced no problems. There is a space above the disk drive that proves handy for disk, cartridge, or cable storage. (Commodore doesn't recommend this space for disk storage when the SX is in use, but I've used it constantly and haven't had any problems with data loss to disks. What can I say —I live dangerously.) Commodore originally had plans to offer another version of this computer, the DX-64, with a second disk drive occupying this space, but this version is on indefinite hold. I've also heard rumors about Commodore marketing an optional slide-in TV tuner for this space.

The carrying handle is a rather ingenious device that doubles as a support for the computer when in use. The handle can be locked in any of several positions to afford the best viewing angle. A zippered pouch that attaches and detaches to the carrying handle quickly and easily via velcro fasteners is large enough to accommodate plenty of accessories.

There is *no* provision for an external battery, e.g., your car's or boat's. Why this provision wasn't included remains a mystery to me, since it would greatly increase the usefulness of the computer. The SX-64 is portable in that it can be easily transported, but you still need a wall outlet to supply the power for the computer. When asked why Commodore didn't include a rechargeable battery with the SX, a company spokesperson replied that it would have added significantly to the weight, and at approximately 26 lbs., the SX-64 is fairly hefty to begin with. Agreed—but why didn't they at least include a jack for external battery power?

There is no built-in modem, which would also have increased the versatility of the SX greatly. It does, however, accept all of the peripherals, including modems, that the standard C-64 uses, with the above-noted exception of the datasette.

If an RF modulator (not included) is used on the audio/video port, the video and audio output of the SX-64 can be enjoyed on a regular TV set. Separate audio and video signals are also available at this port to feed a monitor, such as the 1702. This is an extremely useful provision when using the SX at home, since, as nice as the built-in monitor is, there's nothing like viewing on a big screen.

Aside from the few shortcomings I've mentioned, the SX-64 is an ideal solution for those who need or want to take their 64 with them when they travel. It's easy to look at also, making a neat, businesslike appearance in dark charcoal grey and black—guess that's why I call it the *Sexy 64.*

The SX-64 has a suggested retail price of $995, but it's being discounted at most retailers. The average price I've seen it for is $750-$800, and it's worth every penny!

Commodore Business Machines, Inc., 1200 Wilson Drive, West Chester, PA 19380 (phone: 215-431-9140).

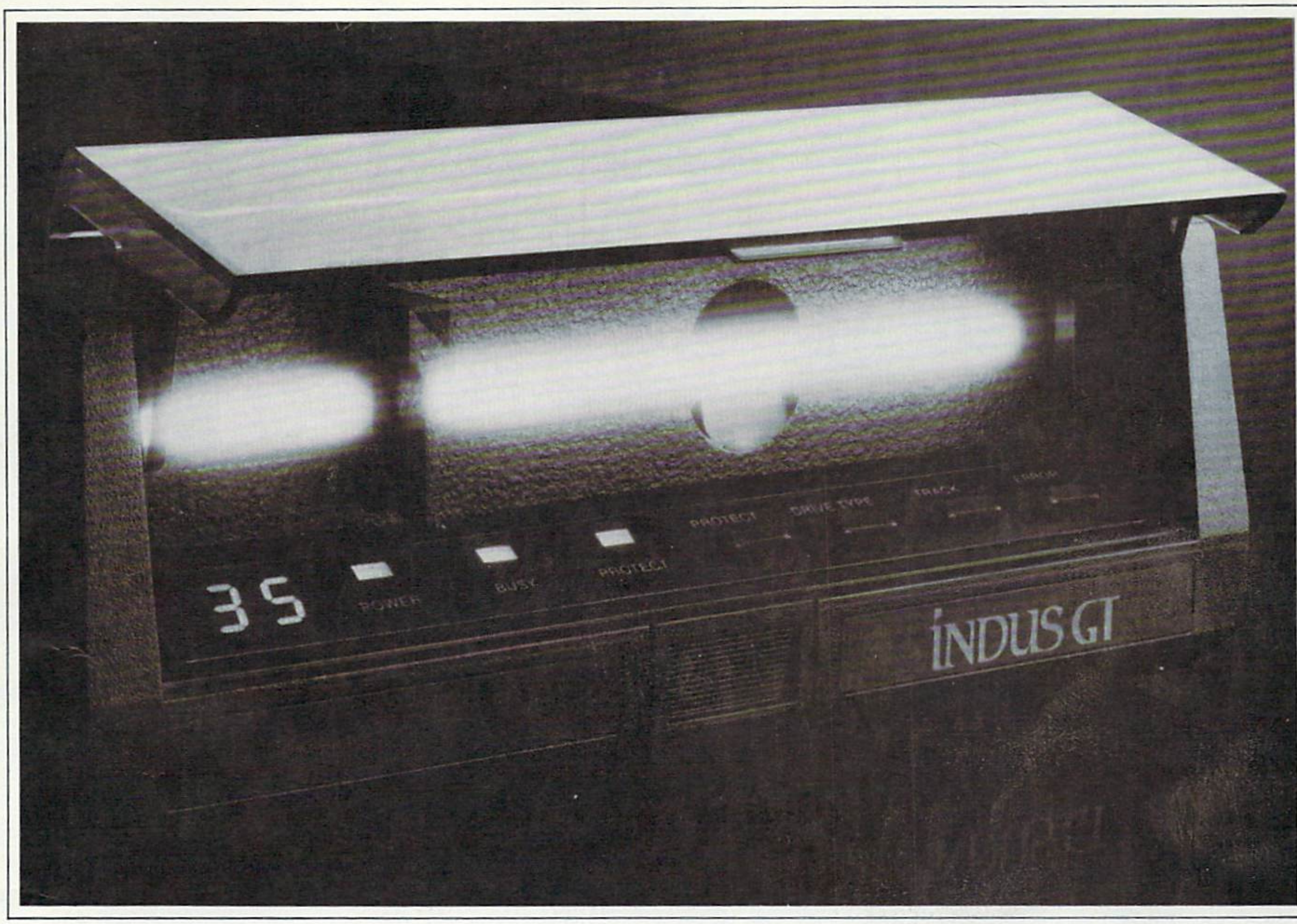
—Tom Benford

CONNECTING THE SX-64 TO A NON-COMMODORE PRINTER

If you're using a Commodore printer or the Cardco LQ-1, LQ-2, or LQ-3 printers, you'll have no problem getting it to work with the SX-64—just plug it into the serial port and away you go. If, however, you're not using any of the above-mentioned printers, you may run into a problem supplying power to your printer interface. The problem is that the Cardco interface uses a "pigtail" connector that attaches to the cassette port to derive its +5-volts operating voltage, and there's no cassette port on the SX-64!

The +5 volts *are* available, however, at either of the joystick ports on pin #7. The solution, therefore, is to get this voltage from the joystick port to the interface, and here's how:

Radio Shack and other electronic stores sell D-9 connectors, the same kind on the ends of joystick cables. Get yourself one of these and locate pin #7 (refer to your *Programmer's Reference Guide,* page 395). Either solder a length of insulated wire onto this pin, or isolate the wire coming from this pin if the connector you bought is already wired. Attach an alligator clip to the other end of the pin #7 wire and clip it onto the "pigtail" connector of the interface, right where *its* wire is soldered on. Of course, you may also cut off the connector on the pigtail and solder the wire directly onto the D-9 connector if you wish, but using the alligator clip allows you to use the interface with both the SX-64 and a standard C-64.



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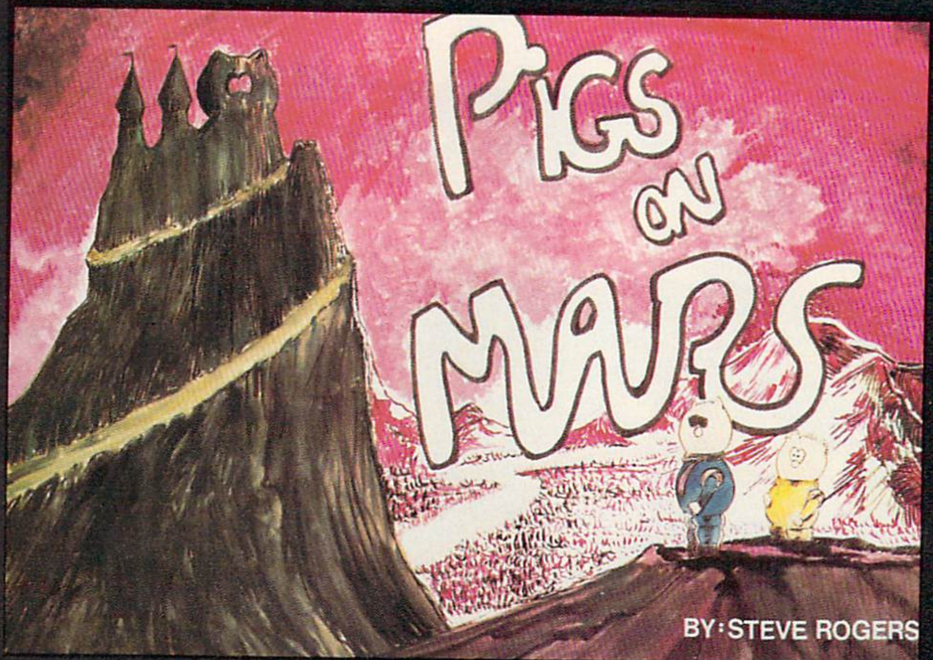
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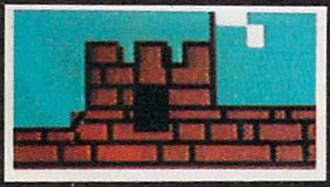
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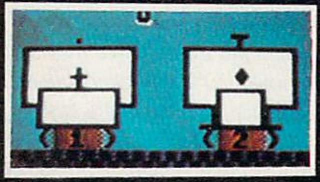
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Reader Service No. 177

VORTEX

Event Horizon Software
Commodore 64
Disk; $74.95

If you plan to start a Bulletin Board System on your Commodore 64, I recommend a serious look at *Vortex* by *Ahoy!*'s own Michael Kleinert. It makes this complex application almost as simple as a game of *Pac-Man*.

The minimum configuration to run a *Vortex* system is a C-64, one 1541 drive, and either a Commodore Automodem or a Hayes Smartmodem (or Smartmodem compatible). The system also supports the use of a hard drive, MSD dual drive, and IEEE interface.

The board can handle a message base of 135 on a 1541. With other drives this number may vary slightly. The number of messages also depends on the number of download files you have: the more files, the fewer messages and vice versa. Not true with a two-drive system, for the messages go on one disk and the download files on the other.

Special features of *Vortex* include up to nine sub-boards, a voting question, and a chat feature that may be selected from the main menu. This generates a howling siren from your monitor's or TV's speaker that is sure to get your attention. Of course, if you don't wish to be disturbed, you can turn down the volume. Additionally, if you want to chat with a user, you have simply to hit a function key to put yourself in chat mode.

The SYSOP of a *Vortex* system is all-powerful. He can grant or take away anyone's access to almost any part of the board (even with a user online–wow!). He may also kill any message and read private messages on the system, public or private. Could Orwell have something to do with this?

A SYSOP need not be able to use the board regularly to keep the system running. The only maintenance necessary is the validation of the message disk every two weeks or so in order to free up any blocks that were "lost" by the 1541.

Logging onto *Vortex* for the first time is a simple matter. You must enter your name and a password. At future log-ins the password you created is used by the system to recognize your existence.

After the system recognizes you (at subsequent log-ins) your mailbox is scanned, and if you have any mail waiting it's read to you and you're asked if you wish to reply. You may then read all messages since your last log-in or you may exit to the main menu. During the reading of the messages, after each message is read to you you are given the option to reply. If you choose to, the reply is automatically addressed for you, and you simply enter the text.

From the main menu you may access any of the features already discussed plus a few more. These include access to the message base, electronic mail, user log/ user interests, time check, log-off, kill messages, alter messages, and downloading. Selecting any option from the main menu usually gives you a sub menu for that option.

When a user is ready to log off,he selects "G" (goodbye) from any menu in the system. He is told how long he has been on the system and then is disconnected.

The *Vortex* manual boasts a setup time of twenty minutes. I found this a bit hard to believe at first, but it's true. The SYSOP must answer a number of questions concerning the message base, download section, user privileges, and various messages (log-in, hours, goodbye). After this is done the system is ready to go.

If you'd like to "test drive" *Vortex* prior to purchase, you can call Event Horizon's data line (212-988-4539) and put the system through its paces.

Event Horizon Corporation, Box 1327, New York, NY 10028 (phone: 212-535-0697; Compuserve number 72436,1456). *–Shane Duffy*

C-64 COMAL (Version 0.14)

COMAL Users Group, USA, Ltd.
Disk; $19.95 (see below)

COMAL is a programming language that's new for the C-64. Although the commands look a lot like BASIC, COMAL also contains turtle graphics much like LOGO's, sprite commands, and structured programming similar to Pascal.

Over 10 years ago, Borge Christensen designed COMAL as a replacement for BASIC. Well, BASIC is still here, but COMAL has made some headway, especially in Europe where it is quite popular. Unlike BASIC, COMAL is standardized; two international committees supervise its development. The standard definition is called the COMAL KERNEL and is followed by C-64 COMAL.

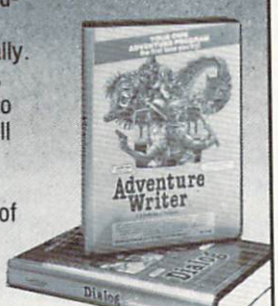
COMAL AND BASIC

If you are already familiar with BASIC, you will be able, within a few minutes, to do simple programming in COMAL. Most BASIC commands are right there, waiting for you, with standard syntax. But, they are supported by a host of additional commands that can make your programming life so much easier. In all, COMAL has over 140 commands, twice the number in C-64 BASIC.

When COMAL commands vary from BASIC, they are usually easier to work with. My two favorites are CAT and CHAIN. Type *CAT* and the directory (or catalog) of your disk will be displayed on the screen. CHAIN is a combination of the LOAD and RUN commands. *CHAIN "Program"* will load and run the program in one easy step. Notice there is no *comma 8* included; COMAL assumes a disk drive is the default storage device.

COMAL does not require num-





bered lines; however, if you think line numbers make your programs easier to read, the AUTO command will insert line numbers as you program. Later, RENUM will change those line numbers so you can set the first line number and the succeeding increments. TRUE and FALSE commands are included to test conditions. The IN command will help you to locate the position of one string within another. And SIZE will tell you the amount of RAM left for your program.

COMAL AND PASCAL

COMAL supports, but does not require, structured programming. Like Pascal, COMAL allows you to write procedures, something like subroutines. A multiline procedure will begin with *PROC procname* followed by a list of parameters. Next comes the body of the procedure, and finally *ENDPROC* to return to the main program. In Pascal, you would write the same subroutine using the *procedure* and *end* statements. Parameters can be passed between the main program and a procedure either by reference or by value. In order to invoke the procedure, you simply give its name followed by a list of arguments.

All this sounds a lot like using GOSUB in BASIC programming, but it's really much more. You give a procedure certain inputs and it produces certain outputs. Within the procedure, however, local declarations can be used to describe data used only internally to the procedure. Procedures usually perform assignments to variables. Another COMAL (and Pascal) structure—the function—is used to return values directly.

So is COMAL really Pascal? Definitely not. While Pascal forces you into structured programming and BASIC promotes unstructured programming, COMAL gives you both. Using commands like PROC, FUNC, CASE, and WHILE, you can write very structured programs in COMAL. But you can always jump back to old BASIC favorites like GOTO if you prefer to program on the fly.

COMAL AND LOGO

With 15 turtle commands, COMAL may actually outdo some versions of the LOGO language, which has popularized turtle graphics over the last several years. In addition to the standard turtle commands to position and move the turtle and to draw in various colors, COMAL includes a few advanced commands.

TURTLESIZE will, as the name implies, allow you to make the turtle larger or smaller. PLOT will mark a point on the screen in the color currently selected for the turtle. And PLOTTEXT will print text on a graphics screen at any coordinates you specify.

COMAL AND SPRITES

Sprites are one of the most powerful graphic features of the C-64. But they are a pain to design and manipulate in BASIC. Like many of the third-party BASIC's for the C-64 that have addressed this problem, COMAL includes very powerful sprite commands. Using these 10 commands, you can define a sprite image for later use, assign an image to a particular sprite, set the sprite's color, and position it on the screen.

Single commands allow you to establish whether the sprite will move in front of or behind graphics images, to hide or turn off a sprite, and to scale the sprite's size up or down. Even testing for a collision between two sprites or between a sprite and a graphics image requires only one command line.

LEARNING COMAL

The COMAL Starter Kit includes the system disk with COMAL and

Reader Service No. 175

sample programs, a 64-page booklet describing all the commands, and a tutorial disk with 22 lessons. To become an experienced COMAL programmer you will also need to buy the *COMAL Handbook* by Len Lindsay for $18.95 or *Beginning COMAL* by Borge Christensen for $19.95 (both available from COMAL Users Group, U.S.A., Ltd.—see below).

The COMAL tutorial is a good idea and does, in fact, take you through the basics of programming. The lessons, however, are too simple to get you very far. This tutorial would be better if it assumed some familiarity with BASIC and showed you the differences—the strengths—of COMAL. Particularly the last two lessons on graphics and on turtle graphics would benefit from some printed instructions. A lesson on sprites would also be welcome.

IS COMAL FOR YOU?

COMAL is a fascinating language. I'd use it before I'd touch BASIC for personal programming tasks. I like its support of structured programming, especially since the two local universities both think Pascal is the only language. In the test programs I wrote, COMAL generally ran faster than BASIC. That was particularly true for sorts. And remarks don't slow COMAL down. The price is right too. COMAL can be copied freely by members of users groups, computer clubs, or school classes.

If you write long programs, or even medium sized ones, you'll be disappointed with this version of COMAL; it leaves you under 10K of available memory. A new cartridge version should be out by the time you read this. Version 2.0 is promised to leave 30K of memory available for our programs, but at a hefty price increase to $99.95.

Since it will not run regular BASIC programs and since it has not gained tremendous popularity in this country, you may be hard pressed to find friends who program in COMAL. Nonetheless, COMAL is a fun language to play with and a great language to learn with.

Price of COMAL Version 0.14 is $19.95; tutorial disk $19.95; command booklet $6.95; starter kit containing all three $29.95. Add $2.00 handling.

COMAL Users Group, U.S.A., Ltd., 5501 Groveland Terrace, Madison, WI 53716 (phone: 608-222-4432). ***—Richard Herring***

SKIWRITER II

Prentice-Hall
Commodore 64
Cartridge; $69.95

SkiWriter II has more than its unusual name (the signature of designer Ken Skier) to distinguish it from most of the other Commodore 64 word processors in the field—a field more crowded than Vail at Christmas week. For one thing, *SkiWriter* is on cartridge, meaning no wait for the program to boot. For another, it features built-in telecommunications capabilities that allow the user to sign on to a BBS or online database in mid-document, download information, and return to the edit function. It's also possible to upload files or chat with another system.

Skiwriter is completely menu driven and makes full use of the function keys. Each menu and submenu appear as a descending list, with an arrow that points to your choice. An accompanying overlay defines the various special functions available, including the usual word processing aids (find/replace, start/end block, delete/copy block, and insert). Other functions allow for full cursor movement and inserting during edit mode. Both right and left delete are available, as are underlining and manual paging.

Dot lines allow the user to embed printer commands within documents; these commands include numbering pages, setting spacing (1 to 3 lines),

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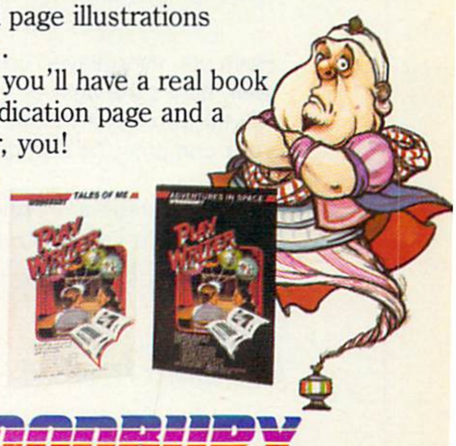
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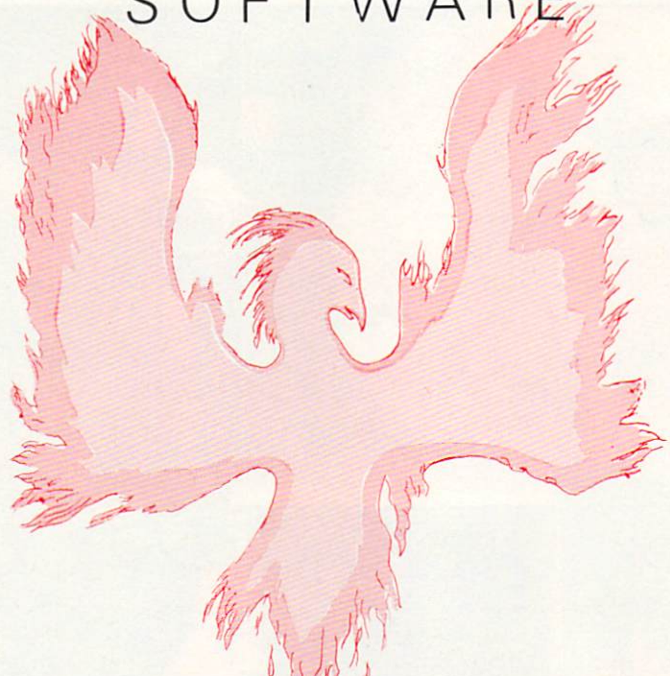
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right and left margins, and text format (normal, centered, or justified), or make comments and headers (footers are not available). Comment dot lines are for leaving notes within the document (e.g.: check spelling of last name, insert quote here, etc.), or dating documents for future reference. Dot lines appear onscreen during editing, but not in the preview or print functions. Bad dot lines will cause error messages in preview or print modes. Pressing any key will return you to the bad dot lines in the edit mode.

Other advanced capabilities available are hanging indents and embedding control sequences into your document. RETURN will set the left margin back to its default value after a hanging indent. Control sequences access any special abilities your printer might have, like backspacing, underlining, or boldface.

Files can be previewed in 80 columns, but you must return to edit to make corrections. *SkiWriter* will save documents to either disk or tape, and is adjustable for either a Commodore or non-Commodore printer.

A modem is necessary to utilize the telecommunications abilities of *SkiWriter*. VICmodem, AUTOmodem, or comparable models are acceptable for use with the baud rate adjustable from 50 to 2400. Using *SkiWriter*, the user can operate in host, terminal, or converse modes. Downloaded information can be captured and kept in memory, or dumped to any peripheral for later use.

The easy-to-read manual introduces and explains each function in an orderly manner. Once the user is familiar with the special keys, he will probably wish to discard the template. After about an hour I easily remembered where most of these special keys were. (Interestingly enough, Ken Skier still can't remember which keys do what.)

SkiWriter enables you to momentarily leave an open file in memory and access other functions, such as checking the directory, using the modem, or formatting a disk. (The last will prove a lifesaver to those of us who forget to keep extra formatted disks around.)

Sometimes, for various reasons, a SAVEd file may become inaccessible, or simply not appear on the *SkiWriter* menu. This happened to me at least twice in the course of testing (the fault of my drive, not the program). A call to Mr. Skier finally helped me retrieve my lost files. When formatting file disks the WP writes a short (five block) program. This program contains the menu for the *SkiWriter* files.

To retrieve an inaccessible document, format a blank disk with *SkiWriter*, write a short two or three line document, and save it to the newly formatted disk with the name of the bad file. Then swap disks and reload the file back into the computer. This done, save the file to the new disk. In this fashion you should be able to retain any bad file. (However, this information is not found in the *SkiWriter* manual because it may not always work.)

SkiWriter II is not without its drawbacks. Screen and character color can be changed by use of the function keys, but because the program is on cartridge, there is no way to save your preferred color combination. This requires several keystrokes every time you go to write. No provision is made for an audible click of keys, invaluable for those of us who accidentally rest fingers on a key too long, and don't catch the seven "l's" in "still".

There is unnecessary duplications of several functions which could have been replaced with other built-in abilities. For instance, in any of the menu or sub-menu boards both f5 and CRSR up move the choice arrow to the top of the selections, while f7 and CRSR down move it to the bottom. (The space bar will also move the arrow through the menu options.)

Last, and most annoying, there is no way to link files. Each file has room for 28,000 characters (somewhere between 10 to 14 double-spaced pages). So if your file is longer, you will have to make sure it breaks at the end of a page to avoid blank spaces in your document.

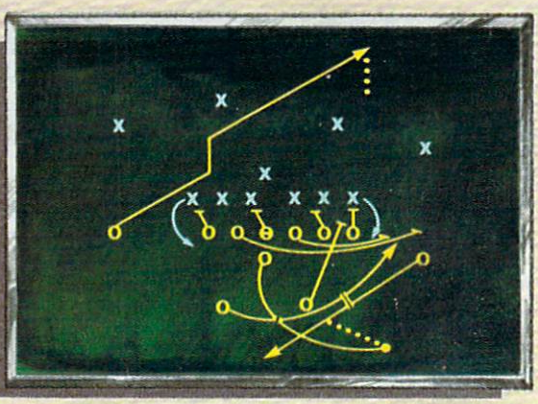
The positive points to this WP far outshine any of its drawbacks, making it a very functional package for most users. Also, in this day of increasing telecommunication, those built-in capabilities of *SkiWriter* make it an excellent choice for users who will be spending time on-line.

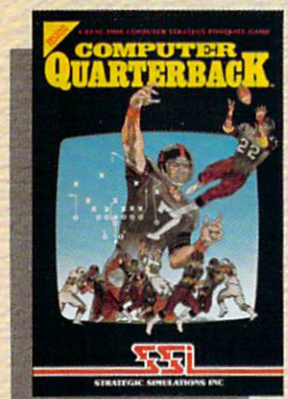
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VIC Eraser

By John Stilwell

A Disk Operating System for the VIC 20

Some programs are useful because they perform astonishing cybernetic feats. And some are useful because they speed up/simplify some of the mundane tasks associated with computing. *VIC Eraser* is a program of the latter type. Like Bob Lloret's *DOS* program (September *Ahoy!*), it will reduce many common disk commands to a single keystroke.

I wrote *Eraser* one lazy summer afternoon. You know, one of those days when you could scream because there is nothing to do. In a stab at ambition, I decided to organize my disks. It didn't take long before I got tired of loading the directory, opening, print#, closing, loading the directory, AIIEEE! If you own a Commodore disk drive and have ever done mass scratching, you can understand my reaction. It's not very hard to scratch files but it sure can be tedious. You may shout, why don't you use a wedge? My answer is, I never got into the habit of using one. I own the Programmer's Aid cartridge and it can't be used with the wedge. Besides, as you'll find, *Eraser* is a lot friendlier.

Load the program and run it. You will be given the list of commands. Place the disk that you want to edit into the drive (device #8) and push 'L'. The disk's directory will be loaded and placed into the rolodex. The first twelve names in the dex will be displayed on the screen next to the number of blocks they occupy. There will be a ' ∧ ' next to the top name. This pointer indicates the file/program that you can edit. Push 'f1' to roll the list up and 'f7' to roll it down.

When the pointer is next to the file that you want scratched, push 'S'. You will be asked to confirm your intention. Push 'Y' and *zap!* it's gone. Originally, this was all *Eraser* could do. Then I added 'rename'. Let's say you have a file called 'Bug Hunt' and you decide that 'Bee Hunt' is more fitting. All you have to do is roll the name so that the pointer is next to it and push 'R'. You will be asked for the new name. Type in 'Bee Hunt' and push RETURN.

To verify a disk push 'V'. When you are done with a disk, you really should verify it. On the chance that a file wasn't closed properly, verifying the disk should fix it.

To format a new disk, push "F". The screen border will flash for about ten seconds and you'll be reminded that everything on the disk will be erased. At this point you are asked to confirm your intention. If you confirm by pushing 'Y', the computer will ask for a name to call the disk.

Eraser can also print directory listings. To get a printout, push 'P'. You will be asked to confirm. Any other key will send you back to rolodex. By pushing any key during a printout, you have the option of pausing or going back to the dex.

The autorun feature loads then runs the program that is next to the pointer. If you try to run a data file, you will drop out of the program. To restart *Eraser,* merely type RUN and push RETURN.

Last, if you have a disk error, push 'W' for Why. You'll be given a two or three word description of the problem. For a more detailed explanation of the problem, see *Description of DOS Error Messages* in the back of the 1541 manual.

Eraser is useful because you always have an updated list of the programs on the disk in front of you. Scratching is extra easy because you never have to type in a filename or play with the potentially dangerous wild cards. ☐

SEE PROGRAM LISTING ON PAGE 76

BOOK REVIEW

HOW TO GET THE MOST OUT OF COMPUSERVE by Charles Bowen and David Peyton (Bantam Computer Books, 1984; $12.95). 278 pages, softbound.

One of the first things people discover about online databases is their expense. Although these services offer a tremendous amount of information, finding what you need quickly and efficiently is like trying to locate an obscure book in the Library of Congress. Without someone's help, it could take days.

Here's the help users need to find their way around CompuServe. *How to Get the Most Out of CompuServe* is not a dictionary of services available, but a road map designed to lead you to interesting and entertaining features that make $6 an hour seem like a reasonable fee.

The book doesn't teach how to interface a computer to CompuServe. There are no references to what program to use with what computer or modem. The Online Survival Kit at the end does explain how to sign on, but doesn't go into what kind of equipment to use. This appendix is probably *the* best reference to have sitting next to your computer while exploring CompuServe.

Bowen and Peyton present online tours that subscribers can follow to learn where the more interesting places are. These include the CB Simulator, the games section (play adventure games, chart your biorhythms, try your hand at backgammon or blackjack), the electronic shopping mall (buy just about anything from records to luggage at Comp-u-Store), home banking, and the Special Interest Groups (SIGs).

CompuServe is not just an information service. It is also a communications medium. The SIGs allow users with similar hobbies or interests to find each other and exchange information. But learning how to use all the facilities available is time consuming (i.e., expensive). By taking the SIG tour, readers learn most of the commands they need to communicate effectively.

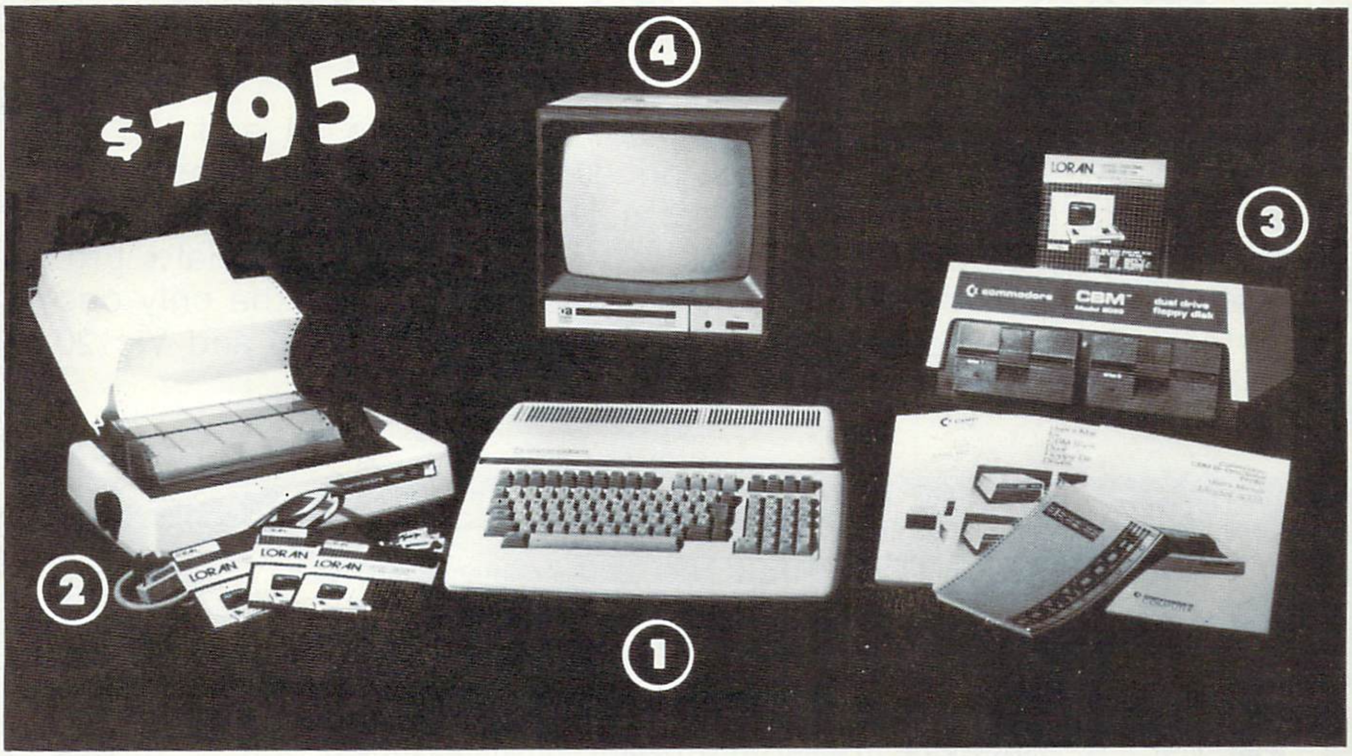
More immediate conversations are possible through the CB Simulator. Just like on Citizen's Band radio, there is a system of etiquette that is followed online. The CB Tour could prevent a novice from doing something embarrassing.

CompuServe is a wonderful information service, but even with online help, novice users can find themselves awash in a sea of potentially useful but effectively useless data. *How to Get the Most Out of CompuServe* will save time, money, and frustration for those who buy and use it. Even a comparative (one year) veteran like myself found useful hints in this book. The $12.95 cover price will easily repay itself by saving users time and money trying to find their way to the information they want. *—Cheryl Peterson*

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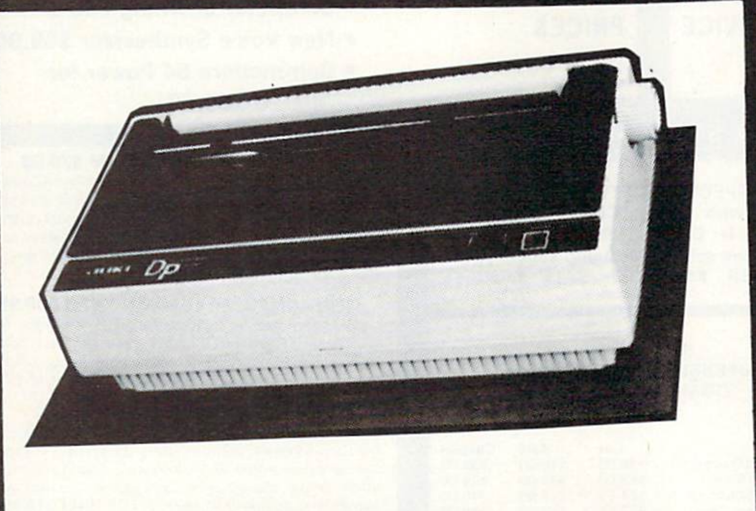
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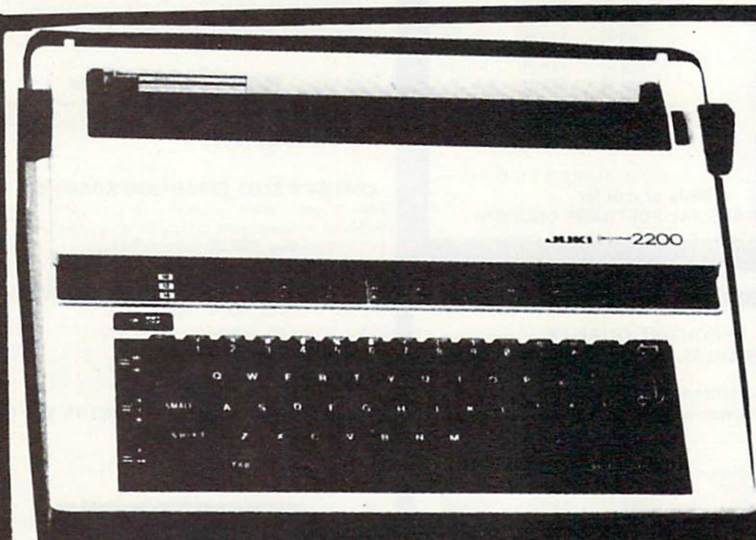
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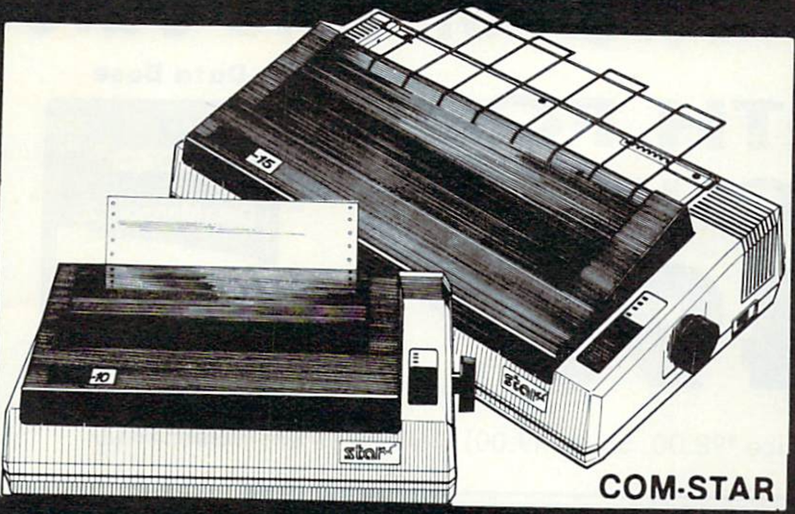
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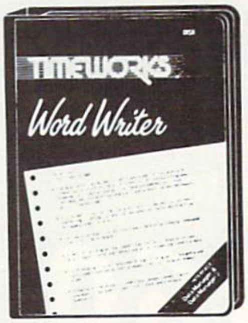
COM-STAR PLUS+ Print Example: ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

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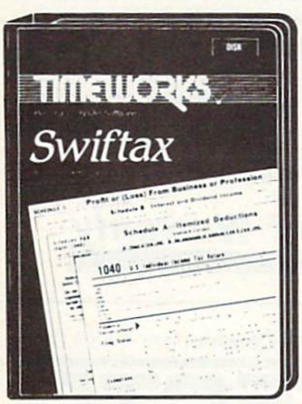
Data Manager 2

This system includes:

A menu-driven program that easily lets you store information on a wi variety of subjects — from general name and address lists, to research dat This program will also calculate and store any corresponding numerical data

Quick access to important information. Items can be easily retrieved a printed by category, name, index code, date range, amount range, or a category of information stored in the system.

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Sophisticated SPRITES

Continued from page 30

to the nth power." On your computer, you may calculate the result by typing

```
PRINT 2^7 + 2^5 + 2^2 + 2^1 <RETURN>
```

where "^" corresponds to the "up arrow" key next to the "RESTORE" key (not to be confused with the "CRSR UP" key!). The binary number 1010 0110 has 0's in positions 6, 4, 3, and 0. Consequently those powers of 2 don't appear in the calculation.

Of course doing many such calculations is far too tedious for human intelligence, so we'll let the computer do them. It is useful to understand the procedure, however, when the sprite image we had hoped to create turns out to be something radically different.

With that introduction (or refresher) of binary math, let's get back to the problem of interpreting the sprite data 27, 165, and 198. If we write the binary representation of each of those numbers, we get these results—which you can verify on your computer by the procedure above:

27	165	198	decimal
0001 1011	1010 0101	1100 0110	binary

If these were the first bytes of data for a high-resolution sprite, the top row of its image would appear like this:

```
...**.***.*..*.***...**.
```

where a dot represents a pixel with the background color and a star represents a pixel with the specified sprite color.

If we have told the VIC-II chip that this data represents one row of a multicolor sprite instead, this is how it would appear:

```
..11**22****111122..11**
```

where the dots are the background color, stars are the sprite color, 1's are multicolor #1, and 2's are multicolor #2. It is easy to see this by using the codes listed earlier and by applying them to pairs of bits in the binary sequence above. The first two 0's give the background color, the next pair (01) corresponds to multicolor #1, the third pair of bits (10) gives the sprite color, and so forth. Notice that each bit pair relates to a pair of adjacent pixels on the screen. The smallest "dot" is two pixels wide in the multicolor sprites.

In order to work with data in some of the VIC-II's registers, we must be able to manipulate and look at individual bits within an 8-bit byte. For example, to define sprite #2 as being a multicolor sprite, we must set bit 2 of VIC-II register 28 to a one. The function defined in the following program will prove useful in simplifying the task of "bit handling."

```
5 REM <><><><><><><><><><><><><>
10 REM<>  DECIMAL TO BINARY   <>
15 REM<>    CONVERTER (X<256)  <>
```

Continued on page 121

PROGRAM LISTINGS

As of our November issue we began utilizing an improved method of printing our program listings. This new method will make entering programs easier for you, but only if you read this entire page carefully before proceeding!

Additionally, as of this issue, our *Bug Repellent* line codes will be found in the whited-out area to the right of their respective program lines.

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!*'s program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart. The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: 22 spaces, for example, as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines, long; VIC 20 lines, a maximum of 88 characters, or 4 screen lines). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the VIC 20 and C-64. The version appropriate for your machine will help you proofread our programs after you type them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See the instructions preceding each program.) □

When You See	It Means	You Type		You Will See
[CLEAR]	Screen Clear	SHIFT	CLR/HOME	
[HOME]	Home		CLR/HOME	
[UP]	Cursor Up	SHIFT	↑ CRSR ↓	
[DOWN]	Cursor Down		↑ CRSR ↓	
[LEFT]	Cursor Left	SHIFT	←CRSR→	
[RIGHT]	Cursor Right		←CRSR→	
[SS]	Shifted Space	SHIFT	Space	
[INSERT]	Insert	SHIFT	INST/DEL	
[DEL]	Delete		INST/DEL	
[RVSON]	Reverse On	CNTRL	9	
[RVSOFF]	Reverse Off	CNTRL	0	
[UPARROW]	Up Arrow		↑	
[BACKARROW]	Back Arrow		←	
[PI]	PI		π	
[EP]	English Pound		£	

When You See	It Means	You Type		You Will See
[BLACK]	Black	CNTRL	1	
[WHITE]	White	CNTRL	2	
[RED]	Red	CNTRL	3	
[CYAN]	Cyan	CNTRL	4	
[PURPLE]	Purple	CNTRL	5	
[GREEN]	Green	CNTRL	6	
[BLUE]	Blue	CNTRL	7	
[YELLOW]	Yellow	CNTRL	8	
[F1]	Function 1		F1	
[F2]	Function 2	SHIFT	F1	
[F3]	Function 3		F3	
[F4]	Function 4	SHIFT	F3	
[F5]	Function 5		F5	
[F6]	Function 6	SHIFT	F5	
[F7]	Function 7		F7	
[F8]	Function 8	SHIFT	F7	

VIC 20 BUG REPELLENT

By Michael Kleinert and David Barron

The program listed below will allow you to quickly debug any *Ahoy!* program you type in on your VIC 20. Follow directions for cassette or disk.

For cassette: type in and save the *Bug Repellent* program, then type RUN 63000[RETURN]SYS 828[RETURN]. If you typed the program properly, it will generate a set of two-letter line codes that will match those listed to the right of the respective program lines (within the white border). (If you didn't type the program properly, of course, no line codes will be generated. You'll have to debug the *Bug Repellent* itself the hard way.)

Once you've got a working *Bug Repellent*, type in the program you wish to check. Save it and type the RUN and SYS commands listed above once again, then compare the line codes generated to those listed in the magazine. If you spot a discrepancy, a typing error exists in that line. Important: you must use exactly the same spacing as the program in the magazine. Due to memory limitations on the VIC, the VIC *Bug Repellent* will register an error if your spacing varies from what's printed.

You may type SYS 828 as many times as you wish, but if you use the cassette for anything, type RUN 63000 to restore the *Repellent.*

When your program has been disinfected you may delete all lines from 63000 on. (Be sure the program you type doesn't include lines above 63000!)

For disk: type in the *Bug Repellent*, save it, and type RUN:NEW[RETURN]. (See above regarding testing the *Bug Repellent* on itself.) Type in the program you wish to check, then SYS 828. This will generate a set of two-letter line codes that you should compare to those listed in the magazine to the right of the respective program lines (within the white border).

To pause the line codes listing, press SHIFT. To permanently pause it, press SHIFT LOCK. To continue, release SHIFT LOCK.

To send the list to the printer type OPEN 4,4:CMD 4:SYS 828[RETURN]. When the cursor comes back, type PRINT#4:CLOSE 4[RETURN].

```
•63000 FOR X = 828 TO 1023 :READ Y:POKE X
 ,Y:NEXT:END                                MH
•63001 DATA 169, 0, 133, 63, 133, 64, 165
 , 43, 133, 251                             BD
•63002 DATA 165, 44, 133, 252, 160, 0, 13
2, 254, 32, 228                             FO
•63003 DATA 3, 234, 177, 251, 208, 3, 76,
 208, 3, 230                                ND
•63004 DATA 251, 208, 2, 230, 252, 169, 2
44, 160, 3, 32                              DJ
•63005 DATA 30, 203, 160, 0, 177, 251, 17
0, 230, 251, 208                            LP
•63006 DATA 2, 230, 252, 177, 251, 32, 20
5, 221, 169, 58                             JB
•63007 DATA 32, 210, 255, 169, 0, 133, 25
3, 230, 254, 32                             JF
•63008 DATA 228, 3, 234, 165, 253, 160, 0
, 170, 177, 251                             KA
•63009 DATA 201, 32, 240, 6, 138, 113, 25
1, 69, 254, 170                             HP
•63010 DATA 138, 133, 253, 177, 251, 208,
 226, 165, 253, 41
•63011 DATA 240, 74, 74, 74, 74, 24, 105,
 65, 32, 210
•63012 DATA 255, 165, 253, 41, 15, 24, 10
5, 65, 32, 210
•63013 DATA 255, 169, 13, 32, 210, 255, 1
73, 141, 2, 41
•63014 DATA 1, 208, 249, 230, 63, 208, 2,
 230, 64, 230
•63015 DATA 251, 208, 2, 230, 252, 76, 74
, 3, 169, 236
•63016 DATA 160, 3, 32, 30, 203, 166, 63,
 165, 64, 32
•63017 DATA 205, 221, 169, 13, 32, 210, 2
55, 96, 230, 251
•63018 DATA 208, 2, 230, 252, 96, 0, 76,
73, 78, 69
•63019 DATA 83, 58, 32, 0, 76, 73, 78, 69
, 32, 35
•63020 DATA 32, 0, 0, 0, 0, 0
```

C-64 BUG REPELLENT

By Michael Kleinert and David Barron

Type in, SAVE, and RUN the *Bug Repellent*. Type NEW, then type in or LOAD the *Ahoy!* program you wish to check. When that's done, SAVE your program (don't RUN it!) and type SYS 49152 [RETURN]. You'll be asked if you want the line value codes displayed on the screen or dumped to the printer. If you select screen, it will appear there.

The table will move quickly, too quickly for most mortals to follow. To pause the listing depress and hold the SHIFT key. To pause for an extended period, depress SHIFT LOCK. As long as i is locked, the display will remain frozen.

Compare the codes your machine generates to the codes listed to the right of the respective program lines (within the white border). If you spot a difference, an error exists in that line. Jot down the numbers of lines where contradictions occur, LIST each line, spot the errors, and correct them.

```
•5000 FOR X = 49152 TO 49488 :READ Y:POKE
 X,Y:NEXT:END
•5001 DATA 32, 161, 192, 165, 43, 133, 25
1, 165, 44, 133
•5002 DATA 252, 160, 0, 132, 254, 32, 37,
 193, 234, 177
•5003 DATA 251, 208, 3, 76, 138, 192, 230
, 251, 208, 2
•5004 DATA 230, 252, 76, 43, 192, 76, 73,
 78, 69, 32
•5005 DATA 35, 32, 0, 169, 35, 160, 192,
32, 30, 171
•5006 DATA 160, 0, 177, 251, 170, 230, 25
1, 208, 2, 230
•5007 DATA 252, 177, 251, 32, 205, 189, 1
69, 58, 32, 210
```

```
5008 DATA 255, 169, 0, 133, 253, 230, 25
4, 32, 37, 193                                CL
5009 DATA 234, 165, 253, 160, 0, 76, 13,
 193, 133, 253                                NB
5010 DATA 177, 251, 208, 237, 165, 253,
41, 240, 74, 74                               MB
5011 DATA 74, 74, 24, 105, 65, 32, 210,
255, 165, 253                                 EP
5012 DATA 41, 15, 24, 105, 65, 32, 210,
255, 169, 13                                  GH
5013 DATA 32, 220, 192, 230, 63, 208, 2,
 230, 64, 230                                 AN
5014 DATA 251, 208, 2, 230, 252, 76, 11,
 192, 169, 153                                NG
5015 DATA 160, 192, 32, 30, 171, 166, 63
, 165, 64, 76                                 BF
5016 DATA 231, 192, 96, 76, 73, 78, 69,
83, 58, 32                                    EP
5017 DATA 0, 169, 247, 160, 192, 32, 30,
 171, 169, 3                                  PJ
5018 DATA 133, 254, 32, 228, 255, 201, 8
3, 240, 6, 201                                FK
5019 DATA 80, 208, 245, 230, 254, 32, 21
0, 255, 169, 4                                FL
5020 DATA 166, 254, 160, 255, 32, 186, 2
55, 169, 0, 133                               CL
5021 DATA 63, 133, 64, 133, 2, 32, 189,
255, 32, 192                                  GC
5022 DATA 255, 166, 254, 32, 201, 255, 7
6, 73, 193, 96                                NN
5023 DATA 32, 210, 255, 173, 141, 2, 41,
 1, 208, 249                                  NH
5024 DATA 96, 32, 205, 189, 169, 13, 32,
 210, 255, 32                                 IM
5025 DATA 204, 255, 169, 4, 76, 195, 255
, 147, 83, 67                                 KC
5026 DATA 82, 69, 69, 78, 32, 79, 82, 32
, 80, 82                                      DC
5027 DATA 73, 78, 84, 69, 82, 32, 63, 32
, 0, 76                                       ML
5028 DATA 44, 193, 234, 177, 251, 201, 3
2, 240, 6, 138                                GN
5029 DATA 113, 251, 69, 254, 170, 138, 7
6, 88, 192, 0                                 JK
5030 DATA 0, 0, 0, 230, 251, 208, 2, 230
, 252, 96                                     NA
5031 DATA 170, 177, 251, 201, 34, 208, 6
, 165, 2, 73                                  DM
5032 DATA 255, 133, 2, 165, 2, 208, 218,
 177, 251, 201                                JA
5033 DATA 32, 208, 212, 198, 254, 76, 29
, 193, 0, 169                                 FM
5034 DATA 13, 76, 210, 255, 0, 0, 0           PA
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 59-61 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

FLANKSPEED

FROM PAGE 34

```
•5 POKE53280,12:POKE53281,11                    LL
•6 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKS
PEED[15" "]";                                   ED
•10 PRINT"[RVSON][5" "]MISTAKEPROOF ML EN
TRY PROGRAM[6" "]"                              MC
•15 PRINT"[RVSON][9" "]CREATED BY G. F. W
HEAT[9" "]"                                     DM
•20 PRINT"[RVSON][3" "]COPR. 1984, ION IN
TERNATIONAL INC.[3" "]"                         DH
•30 FORA=54272TO54296:POKEA,0:NEXT              IM
•40 POKE54272,4:POKE54273,48:POKE54277,0:
POKE54278,249:POKE54296,15                      NH
•70 FORA=680TO699:READB:POKEA,B:NEXT            KO
•75 DATA169,251,166,253,164,254,32,216,25
5,96                                            HJ
•76 DATA169,0,166,251,164,252,32,213,255,
96                                              JB
•80 B$="STARTING ADDRESS IN HEX":GOSUB201
0:AD=B:SR=B                                     HC
•85 GOSUB2520:IFB=0THEN80                       FO
•86 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1
)*16                                            KE
•90 B$="ENDING ADDRESS IN HEX":GOSUB2010:
EN=B                                            IF
•95 GOSUB2510:IFB=0THEN80                       FP
•96 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16       MN
•97 IFB>255THENB=B-255:POKE254,PEEK(254)+
1                                               GE
•98 POKE253,B:PRINT                             HN
•100 REM  GET HEX LINE                          IL
•110 GOSUB3010:PRINT": [c P][LEFT]";:FORA
=0TO8                                           FG
•120 FORB=0TO1:GOTO210                          MD
•125 NEXTB                                      ME
•130 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN31
0                                               LH
•135 PRINT" [c P][LEFT]";                       IK
•140 NEXTA:T=AD-(INT(AD/256)*256):PRINT"
"                                               PD
•150 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-2
55                                              LK
•160 NEXT                                       IA
•170 IFA%(8)<>TTHENGOSUB1010:GOTO110            FK
•180 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+
```

```
8:GOTO110                                       MN
·200 REM    GET HEX INPUT                       AB
·210 GETA$:IFA$=""THEN210                       HO
·211 IFA$=CHR$(20)THEN270                       GC
·212 IFA$=CHR$(133)THEN4000                     MD
·213 IFA$=CHR$(134)THEN4100                     KF
·214 IFA$=CHR$(135)THENPRINT" ":GOTO4500        GE
·215 IFA$=CHR$(136)THENPRINT" ":GOTO4700        BJ
·220 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55
:GOTO250                                        GM
·230 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48
:GOTO250                                        LE
·240 GOSUB1100:GOTO210                          LL
·250 PRINTA$"[c P][LEFT]";                      OA
·260 GOTO125                                    CG
·270 IFA>0THEN280                               OP
·272 A=-1:IFB=1THEN290                          OB
·274 GOTO140                                    CJ
·280 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A
-1                                              HG
·285 A=A-1                                      BE
·290 PRINTCHR$(20);:GOTO140                     KH
·300 REM LAST LINE                              AD
·310 PRINT" ":T=AD-(INT(AD/256)*256)            GJ
·320 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T
-255                                            PL
·330 NEXT                                       IA
·340 IFA%(A)<>TTHENGOSUB1010:GOTO110            KF
·350 FORB=0TOA-1:POKEAD+B,A%(B):NEXT            HN
·360 PRINT:PRINT"YOU ARE FINISHED!":GOTO4
000                                             ON
·1000 REM BELL AND ERROR MESSAGES               FL
·1010 PRINT:PRINT"LINE ENTERED INCORRECTL
Y":PRINT:GOTO1100                               DH
·1020 PRINT:PRINT"INPUT A 4 DIGIT HEX VAL
UE!":GOTO1100                                   JA
·1030 PRINT:PRINT"ENDING IS LESS THAN STA
RTING!":B=0:GOTO1100                            HD
·1040 PRINT:PRINT"ADDRESS NOT WITHIN SPEC
IFIED RANGE!":B=0:GOTO1100                      AG
·1050 PRINT:PRINT"NOT ZERO PAGE OR ROM!":
B=0:GOTO1100                                    KN
·1060 PRINT"?ERROR IN SAVE":GOTO1100            EI
·1070 PRINT"?ERROR IN LOAD":GOTO1100            GL
·1080 PRINT:PRINT:PRINT"END OF ML AREA":P
RINT                                            PG
·1100 POKE54276,17:POKE54276,16:RETURN          BH
·1200 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:P
RINTA$:RETURN                                   IM
·2000 REM GET FOUR DIGIT HEX                    PC
·2010 PRINT:PRINTB$;:INPUTT$                    GM
·2020 IFLEN(T$)<>4THENGOSUB1020:GOTO2010        II
·2040 FORA=1TO4:A$=MID$(T$,A,1):GOSUB2060
:IFT(A)=16THENGOSUB1020:GOTO2010                AD
·2050 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)
*16)+T(4):RETURN                                GF
·2060 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-5
5:RETURN                                        EH
·2070 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-4
8:RETURN                                        KP
·2080 T(A)=16:RETURN                            NP
·2500 REM ADRESS CHECK                          LI
·2510 IFAD>ENTHEN1030                           MI
·2515 IFB<SRORB>ENTHEN1040                      MG
·2520 IFB<256OR(B>4096ANDB<49152)ORB>532
47THEN1050                                      MI
·2530 RETURN                                    IM
·3000 REM ADDRESS TO HEX                        EB
·3010 AC=AD:A=4096:GOSUB3070                    HG
·3020 A=256:GOSUB3070                           CE
·3030 A=16:GOSUB3070                            PN
·3040 A=1:GOSUB3070                             MJ
·3060 RETURN                                    IM
·3070 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):
GOTO3090                                        CJ
·3080 A$=CHR$(T+48)                             JP
·3090 PRINTA$;:AC=AC-A*T:RETURN                 AC
·4000 A$="**SAVE**":GOSUB4200                   AI
·4050 OPEN1,T,1,A$:SYS680:CLOSE1                LH
·4060 IFST=0THENEND                             EO
·4070 GOSUB1060:IFT=8THENGOSUB1200              FJ
·4080 GOTO4000                                  FF
·4100 A$="**LOAD**":GOSUB4200                   AB
·4150 OPEN1,T,0,A$:SYS690:CLOSE1                MF
·4160 IFST=64THEN110                            JH
·4170 GOSUB1070:IFT=8THENGOSUB1200              CM
·4180 GOTO4100                                  FO
·4200 PRINT" ":PRINTTAB(14)A$                   FG
·4210 PRINT:A$="":INPUT"FILENAME";A$            OM
·4215 IFA$=""THEN4210                           GF
·4220 PRINT:PRINT"TAPE OR DISK?":PRINT          DF
·4230 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+
A$:RETURN                                       IG
·4240 IFB$<>"T"THEN4230                         FN
·4250 RETURN                                    IM
·4500 B$="CONTINUE FROM ADDRESS":GOSUB201
0:AD=B                                          DK
·4510 GOSUB2515:IFB=0THEN4500                   MA
·4520 PRINT:GOTO110                             OI
·4700 B$="BEGIN SCAN AT ADDRESS":GOSUB201
0:AD=B                                          FH
·4705 GOSUB2515:IFB=0THEN4700                   NK
·4706 PRINT:GOTO4740                            DI
·4710 FORB=0TO7:AC=PEEK(AD+B):GOSUB3030:I
FAD+B=ENTHENAD=SR:GOSUB1080:GOTO110             BK
·4715 PRINT" ";:NEXTB                           EC
·4720 PRINT:AD=AD+8                             GN
·4730 GETB$:IFB$=CHR$(136)THEN110               MN
·4740 GOSUB3010:PRINT": ";:GOTO4710             JD
```

FLANKSPEED OVERLAY

```
·5 OPEN4,4                                      DG
·10 PRINT#4," [25"[c @]"]"                      KO
·11 PRINT#4,"[c N][25" "][c H]"                 KC
·12 PRINT#4,"[c N][25" "][c H]"                 KC
·13 PRINT#4,"[c N][4" "][s O][9"[c Y]"][s
```

```
 P][10" "][c H]"                                 IN
•14 PRINT#4,"[c N][4" "][c H][9" "][c N]
 SAVE[5" "][c H]"                                KB
•15 PRINT#4,"[c N][4" "][c H][9" "][c N][
 10" "][c H]"                                    AA
•16 PRINT#4,"[c N][4" "][c H][9" "][c N][
 10" "][c H]"                                    AA
•17 PRINT#4,"[c N][4" "][c H][9" "][c N][
 10" "][c H]"                                    AA
•18 PRINT#4,"[c N][4" "][c H][9" "][c N][
 10" "][c H]"                                    AA
•19 PRINT#4,"[c N][4" "][c H][9" "][c N]
 LOAD[5" "][c H]"                                EC
•20 PRINT#4,"[c N][4" "][c H][9" "][c N][
 10" "][c H]"                                    AA
•21 PRINT#4,"[c N][4" "][c H][9" "][c N][
 10" "][c H]"                                    AA
•22 PRINT#4,"[c N][4" "][c H][9" "][c N][
 10" "][c H]"                                    AA
•23 PRINT#4,"[c N][4" "][c H][9" "][c N][
 10" "][c H]"                                    AA
•24 PRINT#4,"[c N][4" "][c H][9" "][c N]
 CONTINUE [c H]"                                 HJ
•25 PRINT#4,"[c N][4" "][c H][9" "][c N][
 10" "][c H]"                                    AA
•26 PRINT#4,"[c N][4" "][c H][9" "][c N][
 10" "][c H]"                                    AA
•27 PRINT#4,"[c N][4" "][c H][9" "][c N][
 10" "][c H]"                                    AA
•28 PRINT#4,"[c N][4" "][c H][9" "][c N][
 10" "][c H]"                                    AA
•29 PRINT#4,"[c N][4" "][c H][9" "][c N]
 SCAN[5" "][c H]"                                MD
•30 PRINT#4,"[c N][4" "][s L][9"[c @]"][s
 @][10" "][c H]"                                 DN
•31 PRINT#4,"[c N][25" "][c H]"                  KC
•32 PRINT#4,"[c N][7" "]SHIPSHAPE![8" "][
 c H]"                                           FF
•33 PRINT#4,"[c N][7" "[11"[c Y]"[9" "][c
 H]"                                             NC
•34 PRINT#4," [25"[c Y]"]"                       GH
•40 CLOSE4                                       NE
```

FUTUREWAR!

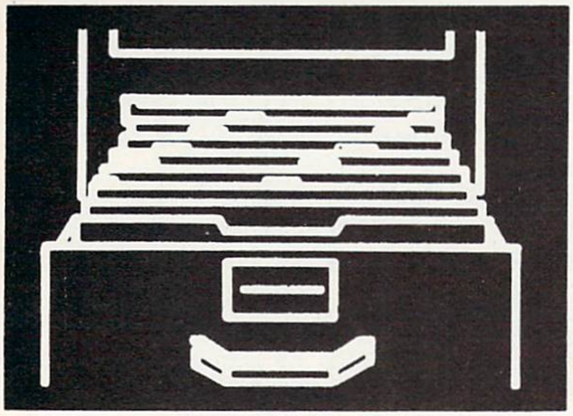
FROM PAGE 119

```
•2 V=53280:W=54272:SM=1024:CM=55296:POKEV
 ,11:POKEV+1,0:PRINT"[CLEAR][WHITE]"             JP
•4 PRINT"[5"[DOWN]"]";TAB(9);"[RVSON][WHI
 TE][5"*"][RVSOFF] FUTUREWAR! [RVSON][5"*
 "]"                                             IJ
•6 PRINTTAB(13);"[DOWN][DOWN]BY B.W.BEHLI
 NG"                                             NP
•8 PRINTTAB(11);"[DOWN][DOWN](C) COPYRIGH
 T 1984"                                         NO
•10 GOSUB 12:GOSUB 22:GOTO 56                    GI
•12 REM ** VARIABLES **                          OE
•14 DIMPN$(2,6),P(2,6),SE(9,4,6),D%(12):T
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 59-61 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

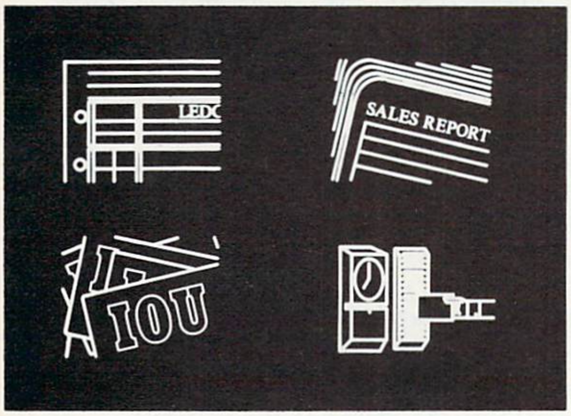
```
 R=36                                            ND
•16 FORI=1TO6:READCL$:PN$(1,I)=CL$:READCL
 $:PN$(2,I)=CL$:NEXTI                            AJ
•18 FORI=1TO9:READA%(I):NEXT:FORI=2TO9:RE
 ADB%(I):NEXT:FORI=0TO9:READC%(I):NEXT           FF
•20 RETURN                                       IM
•22 REM ** DELAY LOOP **                         PC
•24 FORDL=0TO2000:NEXTDL:RETURN                  GI
•26 REM ** PRINT MESSAGE **                      CH
•28 PRINT"[HOME][WHITE][20"[DOWN]"]";MSG$
 :GOSUB 22:RETURN                                JN
•30 REM ** ERASE MESSAGE **                      NG
•32 FORER=1824TO2023:POKEER,32:NEXTER:RET
 URN                                             GA
•34 REM ** PLAYER INFO **                        FB
•36 PRINT"[HOME][WHITE][21"[DOWN]"]";PN$(
 0,PT);",";MSG$:RETURN                           AL
•38 REM ** BOMB SOUND **                         NM
•40 FORI=0TO22:POKEW+I,0:NEXTI:POKEW+24,1
 0:POKEW+5,80:POKEW+12,160                       LN
•42 POKEW+6,255:POKEW+13,252:POKEW+4,17:P
 OKEW+4,16                                       NM
•44 FORI=255TO200STEP-1:POKE54273,I:NEXTI        EP
•46 FORI=255TO75STEP-1:POKE54273,I               NG
•48 FORJ=1TO5:NEXT:NEXT:POKEW+1,10:POKEW+
 8,1:POKEW+5,112:POKEW+6,252                     ID
•50 POKEW+4,129:POKEW+11,129                     PE
•52 FORI=1TO200:NEXTI                            PH
•54 POKEW+4,128:POKEW+11,128:RETURN              JF
•56 PRINT"[CLEAR][DOWN][DOWN] NUMBER OF P
 LAYERS";:INPUTNP                                AF
•58 IFNP<7THEN 62                                CN
•60 PRINT"[DOWN][DOWN] SORRY, NO MORE THA
 N SIX CAN PLAY!":GOSUB 22:GOTO 56               MM
•62 IFNP<1THEN 56                                CK
•64 IFNP<3ORNP>5THEN 68                          EO
•66 PRINT"[DOWN][DOWN] CAN I PLAY WITH YO
 U";:INPUTCP$:GOTO 70                            CC
•68 CP=0:GOTO 74                                 JO
•70 IFLEFT$(CP$,1)="N"THENCP=0:GOTO 74           DO
•72 CP=1                                         HH
•74 FORI=1TONP                                   PA
•76 PRINT"[DOWN] PLAYER #";I;:INPUT"NAME"
 ;PN$(0,I)                                       EP
•78 IFLEN(PN$(0,I))<11THEN 84                    NF
•80 PRINT"[DOWN][YELLOW] THAT NAME IS TOO
  LARGE!"                                        KD
•82 PRINT" NO MORE THAN 10 LETTERS PLEASE
 .[WHITE]":GOTO 76                               EF
•84 PRINT" ";PN$(0,I);",YOUR COLOR IS ";P
 N$(1,I);"[WHITE].":NEXTI                        CI
•86 ONNPGOTO 90, 104                             PC
•88 GOTO 112                                     CE
```

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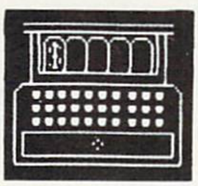


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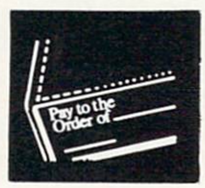
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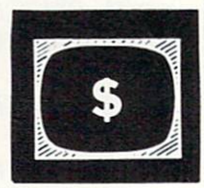
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```
·90 PRINT"[DOWN] PLAYER # 2 NAME? COMPUTE
 R 2"                                       IB
·92 PN$(0,2)="COMPUTER 2":P(2,2)=1          LN
·94 PRINT" ";PN$(0,2);",YOUR COLOR IS ";P
 N$(1,2);"[WHITE].":I=3                     OI
·96 PRINT"[DOWN] PLAYER # 3 NAME? COMPUTE
 R 3"                                       AD
·98 PN$(0,3)="COMPUTER 3":P(2,3)=1          KI
·100 PRINT" ";PN$(0,3);",YOUR COLOR IS ";
 PN$(1,3);"[WHITE]."                        PG
·102 NP=3:GOTO 120                          NN
·104 PRINT"[DOWN] PLAYER # 3 NAME? COMPUT
 ER 3"                                      AD
·106 PN$(0,3)="COMPUTER 3":P(2,3)=1         KI
·108 PRINT" ";PN$(0,3);",YOUR COLOR IS ";
 PN$(1,3);"[WHITE]."                        PG
·110 NP=3:GOTO 120                          NN
·112 IFCP<>1THEN 120                        AH
·114 NP=NP+1:PRINT"[DOWN] PLAYER #";NP;"N
 AME? COMPUTER";NP                          CA
·116 PN$(0,NP)="COMPUTER"+STR$(NP)          OF
·118 PRINT" ";PN$(0,NP);",YOUR COLOR IS "
 ;PN$(1,NP);"[WHITE].":P(2,NP)=1            PE
·120 GOSUB 22:GOSUB 22                      CP
·122 AR=32-((NP-3)*5):PT=INT(NP*RND(0))+1   CA
·124 FORI=1TO6:P(1,I)=AR:NEXTI              HF
·126 REM ** DRAW SCREEN **                  CC
·128 PRINT"[CLEAR]":FORI=0TO40:READS:POKE
 SM+I,S+128:POKECM+I,7:NEXTI                BO
·130 FORI=79TO759STEP40:POKESM+I,160:POKE
 CM+I,7                                     MI
·132 POKESM+I+1,160:POKECM+I+1,7:NEXTI      FO
·134 FORI=761TO799:READS:POKESM+I,S+128:P
 OKECM+I,7:NEXTI                            LG
·136 FORI=1TO4:PRINTTAB(1)"[WHITE] [s N][
 c T][c T][s M][4" "][s N][c T][c T][s M]
 [4" "][s N][c T][c T][s M][4" "][s N][c
 T][c T][s M][4" "][s N][c T][c T][s M]"    LO
·138 PRINTTAB(1)"[s N][4" "][s M][c @][c
 @][s N][4" "][s M][c @][c @][s N][4" "][
 s M][c @][c @][s N][4" "][s M][c @][c @]
 [s N][4" "][s M]"                          CO
·140 PRINTTAB(1)"[s M][4" "][s N][c T][c
 T][s M][4" "][s N][c T][c T][s M][4" "][
 s N][c T][c T][s M][4" "][s N][c T][c T]
 [s M][4" "][s N]"                          CO
·142 PRINTTAB(1)" [s M][c @][c @][s N][4"
 "][s M][c @][c @][s N][4" "][s M][c @][
 c @][s N][4" "][s M][c @][c @][s N][4" "
 ][s M][c @][c @][s N]":NEXTI               OL
·144 PRINTTAB(5)"[s M][4" "][s N]  [s M][
 4" "][s N]  [s M][4" "][s N]  [s M][4" "
 ][s N]"                                    GN
·146 PRINTTAB(6)"[s M][c @][c @][s N][4"
 "][s M][c @][c @][s N][4" "][s M][c @][c
 @][s N][4" "][s M][c @][c @][s N]"         EF
·148 MSG$="[8" "][RVSON] NOW WE CHOOSE SE
 CTORS [RVSOFF]":GOSUB 26:GOSUB 30          NF
·150 R1=INT(9*RND(0))+1:R2=4:R3=INT(9*RND
 (0))+1:R4=1                                PG
·152 REM ** PICKING SECTORS **              NI
·154 MSG$=" PICK A SECTOR.":GOSUB 34        CG
·156 IFP(2,PT)=1THEN 180                    IB
·158 PRINT"[DOWN]ENTER #";:INPUTPI$:IFLEN
 (PI$)<>2THENGOSUB 30:GOTO 154              JE
·160 IFASC(LEFT$(PI$,1))<49 OR ASC(LEFT$(
 PI$,1))>57THENGOSUB 30:GOTO 154            MP
·162 IFASC(RIGHT$(PI$,1))<49 OR ASC(RIGHT
 $(PI$,1))>52THENGOSUB 30:GOTO 154          DE
·164 A=VAL(LEFT$(PI$,1)):B=VAL(RIGHT$(PI$
 ,1))                                       CD
·166 IFSE(A,B,0)=0THENSE(A,B,PT)=1:SE(A,B
 ,0)=1:P(1,PT)=P(1,PT)-1:GOTO 172           NC
·168 MSG$="[12" "][RVSON] ALREADY PICKED
 [RVSOFF]"                                  CF
·170 GOSUB 26:GOSUB 30:GOTO 154             HP
·172 GOSUB 246:TR=TR-1:PT=PT+1:IFPT>NPTTH
 ENPT=1                                     BI
·174 IFTR>0THEN 154                         EP
·176 MSG$="[9" "][RVSON] ALL SECTORS OCCU
 PIED [RVSOFF]":GOSUB 26:GOSUB 30           HF
·178 MSG$="[8" "][RVSON] NOW YOU MUST REI
 NFORCE [RVSOFF]":GOSUB 26:GOSUB 30:GOTO
 208                                        AI
·180 REM ** COMP. TERR. PICK **             CP
·182 PRINT"[DOWN]ENTER #?";                 CJ
·184 IFPT=2THEN 196                         GM
·186 IFSE(R3,R4,0)=0THEN 194                DO
·188 R4=R4+1:IFR4>4THENR4=1:R3=R3+1         LG
·190 IFR3>9THENR3=1                         BH
·192 GOTO 186                               DD
·194 A=R3:B=R4:Z=R3*10+R4:GOTO 206          NH
·196 IFSE(R1,R2,0)=0THEN 204                JC
·198 R2=R2-1:IFR2<1THENR2=4:R1=R1-1         JC
·200 IFR1<1THENR1=9                         BJ
·202 GOTO 196                               DA
·204 A=R1:B=R2:Z=R1*10+R2                   PL
·206 PI$=STR$(Z):PRINTPI$:GOSUB 22:GOTO 1
 66                                         BB
·208 REM ** INITIAL REINFORCEING **         NN
·210 MSG$="":GOSUB 34:PRINT"YOU HAVE";P(1
 ,PT);"ARMIES LEFT"                         BF
·212 IFP(2,PT)=1THEN 234                    GJ
·214 INPUT"REINFORCE #";FO$:IFLEN(FO$)<>2
 THENGOSUB 30:GOTO 210                      MN
·216 IFASC(LEFT$(FO$,1))<49 OR ASC(LEFT$(
 FO$,1))>57THENGOSUB 30:GOTO 210            PE
·218 IFASC(RIGHT$(FO$,1))<49 OR ASC(RIGHT
 $(FO$,1))>52THENGOSUB 30:GOTO 210          IB
·220 A=VAL(LEFT$(FO$,1)):B=VAL(RIGHT$(FO$
 ,1))                                       KH
·222 IFSE(A,B,PT)=1THENSE(A,B,0)=SE(A,B,0
 )+1:P(1,PT)=P(1,PT)-1:GOTO 228             CJ
·224 MSG$="[11" "][RVSON] NOT YOUR SECTOR
 ! [RVSOFF]"                                KP
·226 GOSUB 26:GOSUB 30:GOTO 210             GE
```

```
·228 GOSUB 246:PT=PT+1:IFPT>NPTTHENPT=1        PK
·230 IFP(1,PT)>0THEN 210                        GO
·232 MSG$="[9" "][RVSON] PREPARE FOR BATT
LE!! [RVSOFF]":GOSUB 26:GOSUB 30:GOTO 27
4                                               FA
·234 REM ** COMPUTER REINFORCING **             PP
·236 PRINT"REINFORCE #?";                       EF
·238 RA=INT(9*RND(0))+1:RB=INT(4*RND(0))+
1                                               KK
·240 FORPC=RBTO4:IFSE(RA,PC,PT)<>1THENNEX
TPC:GOTO 238                                    NJ
·242 A=RA:B=PC:PC=RA*10+PC                      CB
·244 PI$=STR$(PC):PRINTPI$:GOSUB 22:GOTO
222                                             FG
·246 REM ** UPDATE SECTORS **                   FN
·248 TA=-2:FORI=1TOA:TA=TA+4:NEXTI              NA
·250 PRINT"[HOME]":IFA/2=INT(A/2)THEN 262       NI
·252 ONBGOTO 254, 256, 258, 260                 EN
·254 PRINTTAB(TA);"[DOWN]";PN$(2,PT):GOTO
272                                             MM
·256 PRINTTAB(TA);"[5"[DOWN]"]";PN$(2,PT)
:GOTO 272                                       EA
·258 PRINTTAB(TA);"[9"[DOWN]"]";PN$(2,PT)
:GOTO 272                                       MM
·260 PRINTTAB(TA);"[13"[DOWN]"]";PN$(2,PT
):GOTO 272                                      JA
·262 ONBGOTO 264, 266, 268, 270                 GJ
·264 PRINTTAB(TA);"[3"[DOWN]"]";PN$(2,PT)
:GOTO 272                                       PF
·266 PRINTTAB(TA);"[7"[DOWN]"]";PN$(2,PT)
:GOTO 272                                       AJ
·268 PRINTTAB(TA);"[11"[DOWN]"]";PN$(2,PT
):GOTO 272                                      BF
·270 PRINTTAB(TA);"[15"[DOWN]"]";PN$(2,PT
)                                               NF
·272 PRINTTAB(TA);"[WHITE][4" "][UP]":PRI
NTTAB(TA);SE(A,B,0):GOSUB 30:RETURN             PG
·274 REM ** MAIN ROUTINE **                     JB
·276 AM=0:EA%=0:EA=0:FORX=1TO9:FORY=1TO4:
IFSE(X,Y,PT)=1THENAM=AM+.75:EA=EA+2             AG
·278 NEXTY:IFEA=8THENEA%=EA%+EA                 BG
·280 EA=0:NEXTX:IFAM>0THEN 286                  BH
·282 PT=PT+1:IFPT>NPTHENPT=1                    AE
·284 GOTO 274                                   CN
·286 IFAM<3THENAM=3                             CD
·288 P(1,PT)=INT(AM):AB=RND(0)*.5:P(1,PT)
=INT(P(1,PT)+(AB*P(1,PT)))+EA%                  GC
·290 MSG$="":GOSUB 34:PRINT"YOU HAVE";P(1
,PT);"ARMIES TO STATION"                        DB
·292 IFP(2,PT)=1THEN 590                        GC
·294 INPUT"WHAT SECTOR #";RI$:IFLEN(RI$)<
>2THENGOSUB 30:GOTO 290                         KK
·296 IFASC(LEFT$(RI$,1))<49 OR ASC(LEFT$(
RI$,1))>57THENGOSUB 30:GOTO 290                 HE
·298 IFASC(RIGHT$(RI$,1))<49 OR ASC(RIGHT
$(RI$,1))>52THENGOSUB 30:GOTO 290               HJ
·300 A=VAL(LEFT$(RI$,1)):B=VAL(RIGHT$(RI$
,1))                                            BL
·302 IFSE(A,B,PT)=1THEN 308                     EE
·304 MSG$="[11" "][RVSON] NOT YOUR SECTOR
! [RVSOFF]"                                     KP
·306 GOSUB 26:GOSUB 30:GOTO 290                 HM
·308 PRINT"[UP][20" "]":INPUT"[UP]HOW MAN
Y";ST%                                          KB
·310 IFST%<=P(1,PT)THENSE(A,B,0)=SE(A,B,0
)+ST%:P(1,PT)=P(1,PT)-ST%:GOTO 316              PJ
·312 MSG$="[7" "][RVSON] YOU DON'T HAVE T
HAT MANY! [RVSOFF]"                             FF
·314 GOSUB 26:GOSUB 30:GOTO 290                 HM
·316 GOSUB 246:IFP(1,PT)<>0THEN 290             DL
·318 MSG$="[8" "][RVSON] ALL TROOPS ON ST
ATION! [RVSOFF]":GOSUB 26:GOSUB 30              EP
·320 MSG$="DO YOU WANT TO ATTACK? [Y/N]":
GOSUB 30:GOSUB 34                               CH
·322 IFP(2,PT)=1THEN 510                        GK
·324 GETK$:IFK$=""THEN 324                      GI
·326 IFK$="N"THEN 450                           IB
·328 INPUT"ATTACK WHAT SECTOR";DS$              KB
·330 IFLEN(DS$)<>2THENGOSUB 30:GOTO 320         BE
·332 IFASC(LEFT$(DS$,1))<49 OR ASC(LEFT$(
DS$,1))>57THENGOSUB 30:GOTO 320                 MM
·334 IFASC(RIGHT$(DS$,1))<49 OR ASC(RIGHT
$(DS$,1))>52THENGOSUB 30:GOTO 320               IF
·336 AD=VAL(LEFT$(DS$,1)):BD=VAL(RIGHT$(D
S$,1))                                          MM
·338 IFSE(AD,BD,PT)=0THEN 344                   MC
·340 MSG$="[5" "][RVSON] THAT'S ONE OF YO
UR SECTORS! [RVSOFF]"                           GG
·342 GOSUB 26:GOSUB 30:GOTO 320                 GO
·344 INPUT"FROM";AS$                            PL
·346 IFLEN(AS$)<>2THENGOSUB 30:GOTO 320         EB
·348 IFASC(LEFT$(AS$,1))<49 OR ASC(LEFT$(
AS$,1))>57THENGOSUB 30:GOTO 320                 PE
·350 IFASC(RIGHT$(AS$,1))<49 OR ASC(RIGHT
$(AS$,1))>52THENGOSUB 30:GOTO 320               PJ
·352 AA=VAL(LEFT$(AS$,1)):BA=VAL(RIGHT$(A
S$,1))                                          EI
·354 IFSE(AA,BA,PT)=1THEN 360                   IH
·356 MSG$="[3" "][RVSON] THAT'S NOT ONE O
F YOUR SECTORS! [RVSOFF]"                       LN
·358 GOSUB 26:GOSUB 30:GOTO 320                 GO
·360 IFSE(AA,BA,0)>1THEN 366                    CD
·362 MSG$="  [RVSON] NOT ENOUGH ARMIES FO
R THIS ATTACK [RVSOFF]"                         DK
·364 GOSUB 26:GOSUB 30:GOTO 320                 GO
·366 IFAA=AD AND BA=BD+1 OR AA=AD AND BA=
BD-1THEN 382                                    IN
·368 IFAA<>AD-1 AND AA<>AD+1THEN 378            CO
·370 IFAD/2=INT(AD/2)THEN 376                   DG
·372 IFBA=BD OR BA=BD-1THEN 382                 BL
·374 GOTO 378                                   CO
·376 IFBA=BD OR BA=BD+1THEN 382                 BG
·378 MSG$="[8" "][RVSON] SECTORS DO NOT C
ONNECT [RVSOFF]"                                DG
·380 GOSUB 26:GOSUB 30:GOTO 320                 GO
·382 IFSE(AA,BA,0)-1=1THENAS%=1:GOTO 388        IC
```

```
•384 MSG$="":GOSUB 30:GOSUB 34:PRINT"ATTA
 CKING STRENGTH [1 -";SE(AA,BA,0)-1;      PD
•386 PRINT"[LEFT]]";:INPUTAS%:IFAS%<1THEN
 382                                      MA
•388 IFAS%>SE(AA,BA,0)-1THEN 382          JB
•390 AL=0:DL=0:FORAT=1TOAS%:A1=INT(6*RND(
 0))+1:D1=INT(6*RND(0))+1                 IA
•392 AL=AL+1:IFA1>D1THENAL=AL-1:DL=DL+1   BG
•394 IFSE(AD,BD,0)-DL<1THEN 400           ND
•396 IFSE(AA,BA,0)-AL<2THEN 402           MF
•398 NEXTAT:GOTO 402                      IL
•400 IFAS%=>SE(AA,BA,0)-ALTHENAS%=SE(AA,B
 A,0)-(AL+1)                              NK
•402 A=AA:B=BA:GOSUB 30:GOSUB 38:SE(A,B,0
 )=SE(A,B,0)-AL:GOSUB 246                 GN
•404 A=AD:B=BD:SE(A,B,0)=SE(A,B,0)-DL:TP=
 PT                                       HL
•406 FORS=1TO6:IFSE(A,B,S)=1THENPT=S:GOSU
 B 246                                    DP
•408 NEXTS:PT=TP:IFSE(A,B,0)<1THEN 422    DJ
•410 IFSE(AA,BA,0)<2THENPOKEW+24,0:GOTO 3
 20                                       HC
•412 MSG$=" SAME ATTACK AGAIN? [Y/N]":POK
 EW+24,0:GOSUB 30:GOSUB 34                KN
•414 IFP(2,PT)=1THEN 580                  GF
•416 GETK$:IFK$=""THEN 416                GK
•418 IFK$="Y"THENGOSUB 30:GOTO 382        DF
•420 GOTO 320                             CF
•422 MSG$="[11" "][RVSON] SECTOR CONQUERE
 D [RVSOFF]":POKEW+24,0:GOSUB 26:GOSUB 30 AH
•424 FORS=1TO6:SE(A,B,S)=0:NEXTS:SE(A,B,P
 T)=1                                     LA
•426 FORX=1TO9:FORY=1TO4:IFSE(X,Y,PT)=1TH
 ENTT=TT+1                                DH
•428 NEXTY:NEXTX:IFTT<>36THENTT=0         GA
•430 IFAS%=SE(AA,BA,0)-1THENOA%=AS%:GOTO
 442                                      EJ
•432 MSG$="":GOSUB 34:PRINT"YOU MUST MOVE
  IN";AS%;"ARMIES MINIMUM"                JH
•434 IFP(2,PT)=1THEN 584                  GJ
•436 INPUT"HOW MANY";OA$:FORC=1TOLEN(OA$)
 :C$=MID$(OA$,C,1)                        LF
•438 IFASC(C$)<49ORASC(C$)>57THEN 432     PG
•440 NEXTC:OA%=VAL(OA$)                   DC
•442 IFOA%<AS% OR OA%>SE(AA,BA,0)-1THEN 4
 32                                       GC
•444 SE(A,B,0)=OA%:GOSUB 246:A=AA:B=BA:SE
 (A,B,0)=SE(A,B,0)-OA%:GOSUB 246          IB
•446 IFTT=36THEN 650                      JO
•448 GOTO 320                             CF
•450 MSG$=" MOVE TROOPS? [Y/N]":GOSUB 30:
 GOSUB 34                                 HH
•452 IFP(2,PT)=1THENK$="N":PRINTTAB(31);"
 [UP]N":GOSUB 22:GOTO 456                 GJ
•454 GETK$:IFK$=""THEN 454                GE
•456 IFK$="N"THENGOSUB 30:GOTO 506        BM
•458 INPUT"MOVE FROM";MF$                 HA
•460 IFLEN(MF$)<>2THEN 450                CC
•462 IFASC(LEFT$(MF$,1))<49 OR ASC(LEFT$(
 MF$,1))>57THEN 450                       FA
•464 IFASC(RIGHT$(MF$,1))<49 OR ASC(RIGHT
 $(MF$,1))>52THEN 450                     FJ
•466 AF=VAL(LEFT$(MF$,1)):BF=VAL(RIGHT$(M
 F$,1))                                   CC
•468 IFSE(AF,BF,PT)=1THEN 474             KH
•470 MSG$="[3" "][RVSON] THAT'S NOT ONE O
 F YOUR SECTORS! [RVSOFF]"                LN
•472 GOSUB 26:GOTO 450                    EO
•474 INPUT"MOVE TO";MT$                   NC
•476 IFLEN(MT$)<>2THEN 450                DA
•478 IFASC(LEFT$(MT$,1))<49 OR ASC(LEFT$(
 MT$,1))>57THEN 450                       BA
•480 IFASC(RIGHT$(MT$,1))<49 OR ASC(RIGHT
 $(MT$,1))>52THEN 450                     IB
•482 AT=VAL(LEFT$(MT$,1)):BT=VAL(RIGHT$(M
 T$,1))                                   DC
•484 IFSE(AT,BT,PT)<>1THEN 470            MJ
•486 IFAF=AT AND BF=BT+1 OR BF=BT-1THEN 4
 98                                       JF
•488 IFAF<>AT-1 AND AF<>AT+1THEN 496      HL
•490 IFAT/2=INT(AT/2)THEN 494             FH
•492 IFBF=BT OR BF=BT-1THEN 498           AP
•494 IFBF=BT OR BF=BT+1THEN 498           AK
•496 MSG$="[8" "][RVSON] SECTORS DO NOT C
 ONNECT [RVSOFF]":GOSUB 26:GOTO 450       GL
•498 MSG$="":GOSUB 30:GOSUB 34:INPUT"HOW
 MANY";TM%                                NM
•500 IFTM%>SE(AF,BF,0)-1THEN 498          BA
•502 SE(AF,BF,0)=SE(AF,BF,0)-TM%:SE(AT,BT
 ,0)=SE(AT,BT,0)+TM%                      DO
•504 A=AF:B=BF:GOSUB 246:A=AT:B=BT:GOSUB
 246                                      LG
•506 PT=PT+1:IFPT>NPTHENPT=1              AE
•508 GOTO 274                             CN
•510 REM ** COMPUTER MAIN ROUTINE **      AO
•512 Z%=INT(RND(0)*100)+1:IFZ%<90THEN 516 FL
•514 GOSUB 22:GOTO 450                    FK
•516 RA%=INT(9*RND(0))+1                  JD
•518 FORRA=1TO9:RA%=RA%+1:IFRA%>9THENRA%=
 1                                        CK
•520 FORRB=1TO4:IFSE(RA%,RB,PT)=1THENNEXT
 RB:NEXTRA:GOTO 514                       IK
•522 AD=RA%:BD=RB:DS=AD*10+BD:DS$=STR$(DS
 )                                        EJ
•524 IFBD=1THEN 530                       ED
•526 AA=AD:BA=BD-1:IFSE(AA,BA,PT)=1 AND S
 E(AA,BA,0)>2THEN 562                     KB
•528 IFBD=4THEN 532                       EO
•530 AA=AD:BA=BD+1:IFSE(AA,BA,PT)=1 AND S
 E(AA,BA,0)>2THEN 562                     JE
•532 IFAD=1THEN 538                       CO
•534 AA=AD-1:BA=BD:IFSE(AA,BA,PT)=1 AND S
 E(AA,BA,0)>2THEN 562                     PP
•536 IFAD=9THEN 540                       DN
•538 AA=AD+1:BA=BD:IFSE(AA,BA,PT)=1 AND S
 E(AA,BA,0)>2THEN 562                     KE
```

```
·540 IFAD/2<>INT(AD/2)THEN 550                CG
·542 IFBD=4THEN 560                           EN
·544 AA=AD-1:BA=BD+1:IFSE(AA,BA,PT)=1 AND
 SE(AA,BA,0)>2THEN 562                        KJ
·546 AA=AD+1:IFSE(AA,BA,PT)=1 AND SE(AA,B
A,0)>2THEN 562                                BE
·548 NEXTRB:NEXTRA:GOTO 514                   ON
·550 IFBD=1THEN 560                           DA
·552 IFAD=1THEN 558                           CM
·554 AA=AD-1:BA=BD-1:IFSE(AA,BA,PT)=1 AND
 SE(AA,BA,0)>2THEN 562                        FG
·556 IFAD=9THEN 560                           ED
·558 AA=AD+1:BA=BD-1:IFSE(AA,BA,PT)=1 AND
 SE(AA,BA,0)>2THEN 562                        ON
·560 NEXTRB:NEXTRA:GOTO 514                   ON
·562 IFSE(AA,BA,0)<SE(AD,BD,0)/2THENNEXTR
B:NEXTRA:GOTO 514                             ID
·564 PRINT"ATTACK WHAT SECTOR?";              DA
·566 AS=AA*10+BA:AS$=STR$(AS)                 CJ
·568 PRINTDS$:GOSUB 22:PRINT"FROM?";AS$:G
OSUB 22                                       CD
·570 AS%=INT(RND(0)*(SE(AA,BA,0)-1))+1        BD
·572 IFSE(AA,BA,0)-1=1THEN 390                DK
·574 IFSE(AA,BA,0)-1>SE(AD,BD,0)ANDAS%<IN
T(SE(AD,BD,0)/1.5)THEN 570                    BB
·576 MSG$="":GOSUB 30:GOSUB 34:PRINT"ATTA
CKING STRENGTH [1 -";SE(AA,BA,0)-1;           PD
·578 PRINT"[LEFT]]?";AS%:GOSUB 22:GOTO 39
0                                             KD
·580 IFSE(AA,BA,0)>SE(AD,BD,0)/2THEN 570      EI
·582 GOTO 320                                 CF
·584 OA%=INT(RND(0)*SE(AA,BA,0))              MC
·586 IFOA%<AS%THEN 584                        AD
·588 PRINT"HOW MANY?";OA%:GOSUB 22:GOTO 4
42                                            KE
·590 REM *** COMPUTER STATION ***             DG
·592 PRINT"WHAT SECTOR #?";                   MA
·594 RA=INT(9*RND(0))+1:RB=INT(4*RND(0))+
1                                             KK
·596 IFSE(RA,RB,PT)=1THEN 594                 AM
·598 AD=RA:BD=RB                              ML
·600 IFBD=1THEN 606                           EB
·602 AA=AD:BA=BD-1:IFSE(AA,BA,PT)=1THEN 6
38                                            AG
·604 IFBD=4THEN 608                           DM
·606 AA=AD:BA=BD+1:IFSE(AA,BA,PT)=1THEN 6
38                                            KH
·608 IFAD=1THEN 614                           DF
·610 AA=AD-1:BA=BD:IFSE(AA,BA,PT)=1THEN 6
38                                            LA
·612 IFAD=9THEN 616                           FD
·614 AA=AD+1:BA=BD:IFSE(AA,BA,PT)=1THEN 6
38                                            BH
·616 IFAD/2<>INT(AD/2)THEN 626                CK
·618 IFBD=4THEN 636                           FD
·620 AA=AD-1:BA=BD+1:IFSE(AA,BA,PT)=1THEN
 638                                          NK
·622 AA=AD+1:IFSE(AA,BA,PT)=1THEN 638         GP
·624 GOTO 594                                 DC
·626 IFBD=1THEN 636                           EG
·628 IFAD=1THEN 634                           DL
·630 AA=AD-1:BA=BD-1:IFSE(AA,BA,PT)=1THEN
 638                                          AN
·632 IFAD=9THEN 636                           FB
·634 AA=AD+1:BA=BD-1:IFSE(AA,BA,PT)=1THEN
 638                                          KG
·636 GOTO 594                                 DC
·638 A=AA:B=BA:Z=AA*10+BA                     DB
·640 RI$=STR$(Z):PRINTRI$:GOSUB 22            JP
·642 PRINT"[UP][20" "]":PRINT"[UP]HOW MAN
Y?";                                          IJ
·644 ST%=INT(RND(0)*P(1,PT))+1:IFST%<10TH
EN 648                                        CH
·646 IFST%>P(1,PT)/5THENST%=INT(P(1,PT)/5
):IFST%<1THENST%=1                            NH
·648 PRINTST%:GOSUB 22:GOTO 310               OD
·650 REM ** GAME OVER **                      ML
·652 IFP(2,PT)=1THEN 670                      GF
·654 MSG$="[5" "][RVSON][10"*"] YOU WON!
[10"*"][RVSOFF]"                              OE
·656 GOSUB 30:GOSUB 26                        BI
·658 POKEV,14:POKEV+1,6:PRINT"[CLEAR][WHI
TE][3"[DOWN]"[8"[RIGHT]"]* * * * *[RVS
ON][RED][15" "][RVSOFF]"                      OM
·660 FORI=1TO3:PRINTTAB(7);"[WHITE] * * *
 * * [RVSON][15" "][RVSOFF]"                  KO
·662 PRINTTAB(7);"[WHITE]* * * * *[RVSO
N][RED][15" "][RVSOFF]":NEXTI                 JF
·664 FORI=1TO3:PRINTTAB(7);"[RVSON][WHITE
][26" "][RVSOFF]"                             GL
·666 PRINTTAB(7);"[RVSON][RED][26" "][RVS
OFF]":NEXTI                                   GJ
·668 MSG$=" YOU ARE A TRUE CHAMPION!!":GO
SUB 34:END                                    DC
·670 MSG$="[4" "][RVSON] YOU HUMANS ARE S
O EASY TO BEAT! [RVSOFF]"                     PM
·672 GOSUB 30:GOSUB 26:END                    MH
·674 REM ** DATA STARTS **                    CJ
·676 DATA"[WHITE][RVSON]WHITE[RVSOFF]","[
WHITE][RVSON]PL#1[RVSOFF]","[RED][RVSON]
RED[RVSOFF]","[RED][RVSON]PL#2[RVSOFF]",
"[c 7][RVSON]BLUE[RVSOFF]","[c 7][RVSON]
PL#3[RVSOFF]","[YELLOW][RVSON]YELLOW[RVS
OFF]"                                         PI
·678 DATA"[YELLOW][RVSON]PL#4[RVSOFF]","[
PURPLE][RVSON]PURPLE[RVSOFF]","[PURPLE][
RVSON]PL#5[RVSOFF]","[GREEN][RVSON]GREEN
[RVSOFF]","[GREEN][RVSON]PL#6[RVSOFF]"        AN
·680 DATA1,2,3,4,5,6,7,8,9,15,13,4,14,6,7
,8,9,10,11,12,13,4,14,6,7,8,9                 AI
·682 DATA32,32,32,49,49,32,32,50,49,32,32
,51,49,32,32,52,49,32,32,53,49,32,32          IK
·684 DATA54,49,32,32,55,49,32,32,56,49,32
,32,57,49,32,32,32,32                         FN
·686 DATA32,32,49,52,32,32,50,52,32,32,51
,52,32,32,52,52,32,32,53,52,32,32             KP
```

```
·688 DATA54,52,32,32,55,52,32,32,56,52,32
 ,32,57,52,32,32,32                       BL
```

BEFORE ENTERING TELELINK 64...you must enter and run *Flankspeed, Ahoy!*'s machine language entry program. See the introduction to *Flankspeed* on page 34.

TELELINK 64

FROM PAGE 98

First byte (starting address): 1500 Last byte (ending address): 19FF

```
1500: EA A9 36 85 01 A9 01 85 81
1508: FD A9 1A 85 FE A6 C5 A0 5B
1510: 00 84 D4 84 C6 AD 8D 02 F1
1518: F0 03 4C A5 15 E0 3C D0 01
1520: 1C B1 FD 29 7F A6 FE E0 1B
1528: CF D0 06 A6 FD E0 FF F0 45
1530: DC 20 D2 FF E6 FD D0 D5 8B
1538: E6 FE 4C 0D 15 E0 04 D0 42
1540: 11 A2 88 A0 1E 20 2F 16 A0
1548: A5 FD 8D 08 18 A5 FE 8D CB
1550: 09 18 E0 05 D0 11 A2 A4 80
1558: A0 1C 20 2F 16 A5 FD 8D AB
1560: 0A 18 A5 FE 8D 0B 18 E0 B8
1568: 06 D0 13 A2 BE A0 0A 20 7E
1570: 2F 16 A5 FE C9 1A F0 02 31
1578: C6 FE A9 01 85 FD E0 03 50
1580: D0 8B A0 00 B1 FD 29 7F D5
1588: A6 FE E0 CF D0 06 A6 FD 5A
1590: E0 FF F0 0E 20 D2 FF E6 4A
1598: FD D0 02 E6 FE A2 80 20 92
15A0: 17 18 4C 0D 15 E0 04 D0 F3
15A8: 4B A2 C6 A0 19 20 2F 16 7C
15B0: AD 08 18 85 FD AD 09 18 D0
15B8: 85 FE A6 C5 A9 00 85 C6 9F
15C0: 85 D4 E0 3C D0 20 A4 FE CC
15C8: CC 0B 18 D0 07 A4 FD CC FF
15D0: 0A 18 F0 E6 A0 00 B1 FD 1B
15D8: 29 7F 20 D2 FF E6 FD D0 2A
15E0: D9 E6 FE 4C BA 15 E0 03 A0
15E8: D0 D0 A2 DD A0 12 20 2F 0D
15F0: 16 4C 0D 15 E0 05 D0 14 40
15F8: A2 ED A0 0C 20 2F 16 AD 49
1600: 08 18 85 FD AD 09 18 85 F7
1608: FE 4C 0D 15 E0 06 D0 13 40
1610: A2 F7 A0 08 20 2F 16 A5 5E
1618: FE C9 CF F0 02 E6 FE A9 33
1620: FF 85 FD E0 03 D0 05 A9 07
1628: 37 85 01 60 4C 0D 15 20 D4
1630: AA 16 4C 15 18 EA EA EA 2B
1638: EA EA EA EA EA EA EA EA 8F
1640: C9 89 D0 0C A9 00 8D 06 AD
1648: 18 A9 60 A0 0F 4C 90 16 0D
1650: C9 8A D0 0C A9 01 8D 06 BF
1658: 18 A9 6C A0 10 4C 90 16 2A
1660: C9 8B D0 1B A9 01 85 FB CD
1668: 8D 08 18 8D 0A 18 A9 1A 89
1670: 85 FC 8D 09 18 8D 0B 18 52
1678: A9 79 A0 11 4C 90 16 C9 0A
1680: 8C D0 03 4C CC FF AA BD 62
1688: 00 18 20 D2 FF 4C D9 19 D2
1690: 48 20 CC FF 68 AA 20 AA A3
1698: 16 4C 80 19 EA EA EA EA 40
16A0: EA EA EA EA EA EA EA EA F7
16A8: EA EA BD 00 17 20 D2 FF 46
16B0: E8 88 D0 F6 60 EA EA EA 0B
16B8: EA EA EA EA EA EA EA EA 10
16C0: A9 36 85 01 A9 01 85 FD 55
16C8: A9 1A 85 FE A9 FD A6 FB 5B
16D0: A4 FC 20 D8 FF A9 37 85 D1
16D8: 01 60 EA EA EA EA EA EA BB
16E0: EA EA EA EA EA EA EA EA 38
16E8: EA EA EA EA EA EA EA EA 40
16F0: EA EA EA EA EA EA EA EA 48
16F8: EA EA EA EA EA EA EA EA 50
1700: EA EA EA EA EA EA EA EA 57
1708: EA EA EA EA EA EA EA EA 5F
1710: EA EA EA EA EA EA EA EA 67
1718: EA EA EA EA EA EA EA EA 6F
1720: EA EA EA EA EA EA EA EA 77
1728: EA EA EA EA EA EA EA EA 7F
1730: EA EA EA EA EA EA EA EA 87
1738: EA EA EA EA EA EA EA EA 8F
1740: EA EA EA EA EA EA EA EA 97
1748: EA EA EA EA EA EA EA EA 9F
1750: EA EA EA EA EA EA EA EA A7
1758: EA EA EA EA EA EA EA EA AF
1760: 20 0D 0D C2 D5 C6 C6 C5 86
1768: D2 20 CF CE 20 0D 0D C2 F6
1770: D5 C6 C6 C5 D2 20 CF C6 23
1778: C6 20 0D 0D C2 D5 C6 C6 9F
1780: C5 D2 20 D2 C5 D3 C5 D4 40
1788: 0D 0D 53 45 54 20 53 54 57
1790: 41 52 54 20 4F 46 20 53 A1
1798: 45 4C 45 43 54 45 44 20 B0
17A0: 54 45 58 54 0D 0D 53 45 99
17A8: 54 20 45 4E 44 20 4F 46 AA
17B0: 20 53 45 4C 45 43 54 45 D7
17B8: 44 20 54 45 58 54 0D 0D 7D
17C0: 42 41 43 4B 55 50 0D 0D 92
17C8: 44 49 53 50 4C 41 59 20 01
17D0: 53 45 4C 45 43 54 45 44 1C
17D8: 20 54 45 58 54 0D 0D 44 9D
17E0: 49 53 50 4C 41 59 20 42 17
17E8: 55 46 46 45 52 0D 0D 43 BF
17F0: 4F 4E 54 49 4E 55 45 0D 22
17F8: 0D 53 4B 49 50 0D 0D 0D 65
1800: AA AA AA AA AA AA 01 08 09
1808: 01 1A 01 1A AA 0D AA AA 4B
1810: AA AA AA AA 08 A2 00 A0 06
1818: 00 C8 D0 FD E8 D0 FA 60 C4
1820: 20 21 22 23 24 25 26 27 3D
1828: 28 29 2A 2B 2C 2D 2E 2F 85
1830: 30 31 32 33 34 35 36 37 CD
1838: 38 39 3A 3B 3C 3D 3E 3F 16
1840: 40 61 62 63 64 65 66 67 3F
```

```
1848: 68 69 6A 6B 6C 6D 6E 6F A7
1850: 70 71 72 73 74 75 76 77 EF
1858: 78 79 7A 5B 5C 5D 5E 5F 97
1860: A9 36 85 01 AD 08 18 85 1A
1868: FD AD 09 18 85 FE A9 FD 61
1870: AE 0A 18 AC 0B 18 20 D8 0A
1878: FF A9 37 85 01 60 AA AA 95
1880: AA AA AA AA AA 03 10 11 F9
1888: 13 4C D8 FF A9 80 4C 90 C7
1890: FF AA 10 AE 07 18 A0 00 B9
1898: A9 01 20 BA FF A9 00 AE 76
18A0: 0A 18 8E 08 18 AC 0B 18 41
18A8: 8C 09 18 20 D5 FF 8E 0A E4
18B0: 18 8C 0B 18 86 FB 84 FC 7C
18B8: 60 AA AA AA AA AA AA AA C3
18C0: AA 41 42 43 44 45 46 47 49
18C8: 48 49 4A 4B 4C 4D 4E 4F 27
18D0: 50 51 52 53 54 55 56 57 6F
18D8: 58 59 5A AA AA AA AA AA 3A
18E0: A5 FC C9 CF 90 08 A9 21 80
18E8: 8D 04 D4 4C 31 EA A9 00 61
18F0: 8D 04 D4 4C 31 EA 78 A9 E1
18F8: E0 8D 14 03 A9 18 8D 15 E2
1900: 03 58 60 85 AA AA AA AA EB
1908: 14 AA 00 AA AA 0D AA AA 7E
1910: 86 87 AA 88 AA AA AA AA FB
1918: AA AA AA AA AA AA AA AA 6D
1920: 20 21 22 23 24 25 26 27 3D
1928: 28 29 2A 2B 2C 2D 2E 2F 85
1930: 30 31 32 33 34 35 36 37 CD
1938: 38 39 3A 3B 3C 3D 3E 3F 16
1940: 40 C1 C2 C3 C4 C5 C6 C7 E1
1948: C8 C9 CA CB CC CD CE CF AA
1950: D0 D1 D2 D3 D4 D5 D6 D7 F2
1958: D8 D9 DA 5B 5C 5D 5E 5F B8
1960: 20 41 42 43 44 45 46 47 5E
1968: 48 49 4A 4B 4C 4D 4E 4F C6
1970: 50 51 52 53 54 55 56 57 0F
1978: 58 59 5A 3B 3C 3D 3E 14 8B
1980: A2 02 20 C6 FF 20 E4 FF 11
1988: AA F0 34 A6 90 D0 30 29 B9
1990: 7F AA BD 00 19 C9 0D D0 39
1998: 07 A8 A9 20 20 D2 FF 98 9D
19A0: 20 D2 FF AC 06 18 D0 D8 08
19A8: A6 FC E0 CF D0 06 A6 FB 76
19B0: E0 FF F0 CC 91 FB E6 FB BF
19B8: D0 C6 E6 FC 4C 80 19 20 3A
19C0: CC FF A9 A4 20 D2 FF A9 78
19C8: 9D 20 D2 FF A2 02 20 C9 E7
19D0: FF 20 E4 FF F0 03 4C 40 56
19D8: 16 20 CC FF 4C 80 19 AA 6C
19E0: AA 41 42 43 44 45 46 47 69
19E8: 48 49 4A 4B 4C 4D 4E 4F 47
19F0: 50 51 52 53 54 55 56 57 8F
19F8: 58 59 5A 3B 3C 3D 3E 14 0C
```

TELELINK 64 OVERLAY

```
•5 OPEN4,4                                                      DG
•10 PRINT#4," [29"[c @]"]"                                      MG
•11 PRINT#4,"[c N][29" "][c H]"                                 AK
•12 PRINT#4,"[c N][29" "][c H]"                                 AK
•13 PRINT#4,"[c N] [UPARROW]C[5" "][s O][9"[c Y]"][s P] START[4" "][c H]"   LJ
•14 PRINT#4,"[c N] BUFFER [c H][9" "][c N] SELECTED [c H]"      MJ
•15 PRINT#4,"[c N]  ON[4" "][c H][9" "][c N]  TEXT[4" "][c H]"  KM
•16 PRINT#4,"[c N][8" "][c H][9" "][c N][10" "][c H]"           KI
•17 PRINT#4,"[c N][8" "][c H][9" "][c N][10" "][c H]"           KI
•18 PRINT#4,"[c N] [UPARROW]P[5" "][c H][9" "][c N] END[6" "][c H]"   LO
•19 PRINT#4,"[c N] BUFFER [c H][9" "][c N][10" "][c H]"         LE
•20 PRINT#4,"[c N]  OFF[3" "][c H][9" "][c N] CONTINUE [c H]"   EB
•21 PRINT#4,"[c N][8" "][c H][9" "][c N][10" "][c H]"           KI
•22 PRINT#4,"[c N][8" "][c H][9" "][c N][10" "][c H]"           KI
•23 PRINT#4,"[c N] [UPARROW]Q[5" "][c H][9" "][c N] BACKUP[3" "][c H]"   CB
•24 PRINT#4,"[c N] BUFFER [c H][9" "][c N][10" "][c H]"         LE
•25 PRINT#4,"[c N]  RESET [c H][9" "][c N] SKIP[5" "][c H]"     FJ
•26 PRINT#4,"[c N][8" "][c H][9" "][c N][10" "][c H]"           KI
•27 PRINT#4,"[c N][8" "][c H][9" "][c N][10" "][c H]"           KI
•28 PRINT#4,"[c N] [UPARROW]S[5" "][c H][9" "][c N] SLOW[5" "][c H]"   GA
•29 PRINT#4,"[c N][8" "][c H][9" "][c N] SCROLL  [c H]"         BN
•30 PRINT#4,"[c N] EXIT[3" "][s L][9"[c @]"][s @] EXIT[5" "][c H]"   PF
•31 PRINT#4,"[c N][29" "][c H]"                                 AK
•32 PRINT#4,"[c N][8" "]TELELINK 64[10" "][c H]"                CE
•33 PRINT#4,"[c N][8" "[12"[c Y]"[11" "][c H]"                  IC
•34 PRINT#4," [29"[c Y]"]"                                      FL
•40 CLOSE4                                                      NE
```

PROGRAMMERS...

We're always interested in looking at top-quality programs for the Commodore home computers. However, a great many factors other than the talent of the programmer contribute toward making a program top-quality. Before submitting a program to *Ahoy!*, we recommend that you send a stamped and self-addressed letter-size envelope to *Ahoy! Writer's and Programmer's Guidelines*, Ion International Inc., 45 West 34th Street—Suite 407, New York, NY 10001.

Sophisticated SPRITES

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 59-61 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

FROM PAGE 122

MAKER/SAVER

```
·1 REM=-=-=-=-=-=-=-=-=-=-=-=                LD
·2 REM= MULTI-COLOR SPRITE  =                CK
·3 REM=     MAKER/SAVER      =               DH
·4 REM=-=-=-=-=-=-=-=-=-=-=-=                LD
·5 INPUT"WHAT IS THE FILENAME FOR THIS SP
 RITE";FL$                                   MJ
·10 INPUT "STORE IN WHICH MEMORY BLOCK (1
 92..199)";BK                                KI
·20 MEM=64*BK                                DC
·25 OPEN 8,8,8,"@0:"+FL$+",S,W"              AG
·26 REM>>>FOR TAPE--REPLACE LINE 25 WITH
 THIS: OPEN 8,1,1,FL$                        CM
·30 FOR ROW=0 TO 20                          FH
·40 READ A$                                  OJ
·50 FOR BYTE=0 TO 2 : TTL=0                  IC
·60 FOR PAIR=3 TO 0 STEP -1                  PO
·70 Q$=MID$(A$,4+4*BYTE-PAIR,1)              LI
·80 Q=0                                      DC
·90 IF Q$="*" THEN Q=2 : GOTO 120            FD
·100 IF Q$="1" THEN Q=1 :GOTO 120            HJ
·110 IF Q$="2" THEN Q=3                      BI
·120 TTL=TTL+(4[UPARROW]PAIR)*Q              KE
·130 NEXT PAIR                               LC
·140 PRINT TTL,                              MB
·150 PRINT#8,TTL                             AA
·160 POKE MEM,TTL : MEM=MEM+1                ON
·170 NEXT BYTE                               LK
·180 PRINT                                   JJ
·190 NEXT ROW                                HN
·200 CLOSE 8                                 NI
·210 END                                     IC
·995 REM .=BKGD / *=SPRITE COLOR             GE
·996 REM  1=MC#1 / 2=MC#2                    GM
·1001 DATA............                       ML
·1002 DATA............                       ML
·1003 DATA............                       ML
·1004 DATA............                       ML
·1005 DATA............                       ML
·1006 DATA............                       ML
·1007 DATA............                       ML
·1008 DATA............                       ML
·1009 DATA............                       ML
·1010 DATA............                       ML
·1011 DATA............                       ML
·1012 DATA............                       ML
·1013 DATA............                       ML
·1014 DATA............                       ML
·1015 DATA............                       ML
·1016 DATA............                       ML
·1017 DATA............                       ML
·1018 DATA............                       ML
·1019 DATA............                       ML
·1020 DATA............                       ML
·1021 DATA............                       ML
```

LOADER

```
·1 REM=-=-=-=-=-=-=-=-=-=-=-=                CC
·2 REM=    SPRITE LOADER    =                IK
·3 REM=-=-=-=-=-=-=-=-=-=-=-=                CC
·10 INPUT"LOAD WHICH SPRITE FILE";FL$        IP
·20 INPUT"WHICH MEMORY BLOCK (192..199)";
 BK                                          KI
·30 MEM=64*BK                                DC
·40 OPEN 8,8,8,"0:"+FL$+",S,R"               DO
·45 REM>> FOR TAPE, REPLACE                  EM
·46 REM>> LINE 40 WITH THIS:                 JD
·47 REM>>    OPEN 8,1,0,FL$                  CB
·50 FOR N=1 TO 63                            MI
·60 INPUT#8,TTL                              NM
·70 PRINT TTL,                               MB
·80 POKE MEM,TTL : MEM=MEM+1                 ON
·90 NEXT N                                   NA
·100 CLOSE 8                                 NI
```

CONTROLLER

```
·1 REM=-=-=-=-=-=-=-=-=-=-=-=                LD
·2 REM=  SPRITE CONTROLLER  =                DP
·3 REM=-=-=-=-=-=-=-=-=-=-=-=                LD
·4 REM                                       JD
·5 REM SPRITE DATA MUST ALREADY              MD
·6 REM BE IN MEMORY.                         MJ
·9 REM                                       JD
·10 DEF FNSB(N)=PEEK(MM) OR 2[UPARROW]N      LG
·20 DEF FNRB(N)=PEEK(MM) AND (255-2[UPARR
 OW]N)                                       FP
·30 DEF FNGB(N)=-((PM AND 2[UPARROW]N)>0)    CB
·40 VV=53248 :REM  VIC ADDRESS               LM
·490 END                                     IC
·495 REM=-=-=-=-=-=-=-=-=-=-=-=              LD
·496 REM= SET SPRITE POINTER  =              PA
·497 REM=   INPUT: SN,BK      =              EN
·498 REM=-=-=-=-=-=-=-=-=-=-=-=              LD
·500 POKE 2040+SN,BK                         EI
·510 RETURN                                  IM
·595 REM=-=-=-=-=-=-=-=-=-=-=-=              LD
·596 REM=  SET X COORDINATE   =              DJ
·597 REM=   INPUT: SN,XX      =              HI
·598 REM=-=-=-=-=-=-=-=-=-=-=-=              LD
·600 MM=VV+16 : X0=XX                        EB
·610 IF XX<256 THEN POKE MM,FNRB(SN):GOTO
 630                                         NN
·620 X0=XX-256 : POKE MM,FNSB(SN)            LF
·630 POKE VV+SN*2,X0                         BD
·640 RETURN                                  IM
·695 REM=-=-=-=-=-=-=-=-=-=-=-=              LD
```

```
·696 REM=  SET Y COORDINATE    =          EC
·697 REM=   INPUT: SN,YY       =          HC
·698 REM=-=-=-=-=-=-=-=-=-=-=-=          LD
·700 POKE VV+SN*2+1,YY                    EH
·710 RETURN                               IM
·795 REM=-=-=-=-=-=-=-=-=-=-=-=          LD
·796 REM=      SET COLOR       =          HJ
·797 REM=   INPUT: SN,CC       =          DG
·798 REM=-=-=-=-=-=-=-=-=-=-=-=          LD
·800 POKE VV+39+SN,CC                     EH
·810 RETURN                               IM
·895 REM=-=-=-=-=-=-=-=-=-=-=-=          LD
·896 REM=  TURN SPRITE ON      =          NJ
·897 REM=   INPUT: SN          =          ID
·898 REM=-=-=-=-=-=-=-=-=-=-=-=          LD
·900 MM=VV+21                             BO
·910 POKE MM,FNSB(SN)                     JA
·920 RETURN                               IM
·995 REM=-=-=-=-=-=-=-=-=-=-=-=          LD
·996 REM=  TURN SPRITE OFF     =          PH
·997 REM=   INPUT: SN          =          ID
·998 REM=-=-=-=-=-=-=-=-=-=-=-=          LD
·1000 MM=VV+21                            BO
·1010 POKE MM,FNRB(SN)                    IB
·1020 RETURN                              IM
·1095 REM=-=-=-=-=-=-=-=-=-=-=-=         LD
·1096 REM= X EXPANSION ON       =         KI
·1097 REM=   INPUT: SN          =         ID
·1098 REM=-=-=-=-=-=-=-=-=-=-=-=         LD
·1100 MM=VV+29 :POKE MM,FNSB(SN)          CF
·1110 RETURN                              IM
·1195 REM=-=-=-=-=-=-=-=-=-=-=           CC
·1196 REM=  X EXPANSION OFF  =            OE
·1197 REM=   INPUT: SN       =            ID
·1198 REM=-=-=-=-=-=-=-=-=-=-=           CC
·1200 MM=VV+29 :POKE MM,FNRB(SN)          CE
·1210 RETURN                              IM
·1295 REM=-=-=-=-=-=-=-=-=-=-=           CC
·1296 REM=  Y EXPANSION ON   =            LP
·1297 REM=-=-=-=-=-=-=-=-=-=-=           CC
·1300 MM=VV+23 :POKE MM,FNSB(SN)          DP
·1310 RETURN                              IM
·1395 REM=-=-=-=-=-=-=-=-=-=-=           CC
·1396 REM=  Y EXPANSION OFF  =            PN
·1397 REM=   INPUT: SN       =            ID
·1398 REM=-=-=-=-=-=-=-=-=-=-=           CC
·1400 MM=VV+23 :POKE MM,FNRB(SN)          EG
·1410 RETURN                              IM
·1495 REM=-=-=-=-=-=-=-=-=-=-=           CC
·1496 REM= MULTI-COLOR MODE  =            FL
·1497 REM=   INPUT: SN       =            ID
·1498 REM=-=-=-=-=-=-=-=-=-=-=           CC
·1500 MM=VV+28 :POKE MM,FNSB(SN)          BK
·1510 RETURN                              IM
·1595 REM=-=-=-=-=-=-=-=-=-=-=           CC
·1596 REM=  HI-RES MODE      =            NO
·1597 REM=   INPUT: SN       =            ID
·1598 REM=-=-=-=-=-=-=-=-=-=-=           CC
```

```
·1600 MM=VV+28 :POKE MM,FNRB(SN)          BN
·1610 RETURN                              IM
·1695 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·1696 REM DEFINE MC COLORS 1&2  =         EF
·1697 REM   INPUT: C1,C2        =         MP
·1698 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·1700 POKE VV+37,C1:POKE VV+38,C2         AN
·1710 RETURN                              IM
·1794 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·1795 REM ANY SPR/SPR COLLISION =         PD
·1796 REM   INPUT: NONE         =         ND
·1797 REM  OUTPUT: PM=0 IF NONE =         MN
·1798 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·1800 PM=PEEK(VV+30)                      BC
·1810 RETURN                              IM
·1820 IF CA AND CB THEN SFLG=-1           LK
·1830 RETURN                              IM
·1894 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·1895 REM ANY SPR/BKGD COLLISION=         CO
·1896 REM   INPUT: NONE         =         ND
·1897 REM  OUTPUT: PM=0 IF NONE =         MN
·1898 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·1900 PM=PEEK(VV+31)                      BF
·1910 RETURN                              IM
·1994 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·1995 REM SPR PRIORITY < BKGD   =         NF
·1996 REM   INPUT: SN           =         EH
·1997 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·2000 MM=VV+27 : POKE MM,FNSB(SN)         PD
·2010 RETURN                              IM
·2094 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·2095 REM SPR PRIORITY > BKGD   =         NH
·2096 REM   INPUT: SN           =         EH
·2097 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·2100 MM=VV+27 : POKE MM,FNRB(SN)         BK
·2110 RETURN                              IM
·2194 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·2195 REM SPR-A//SPR-B COLLIDE? =         GK
·2196 REM   INPUT: SA,SB        =         AP
·2197 REM OUTPUT:SFLG=0 IF NOT  =         OL
·2198 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·2200 PM=PEEK(VV+30) : SFLG=0             IL
·2210 CA=FNGB(SA) : CB=FNGB(SB)           MM
·2220 IF CA AND CB THEN SFLG=-1           LK
·2230 RETURN                              IM
·2294 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·2295 REM SPR-N//BKGD COLLIDE?  =         ON
·2296 REM   INPUT: SN           =         EH
·2297 REM OUTPUT:BFLG=0 IF NOT  =         FI
·2298 REM-=-=-=-=-=-=-=-=-=-=-=-=        LL
·2300 PM=PEEK(VV+31)                      BF
·2310 CA=FNGB(SN) : BFLG=0                KP
·2320 IF CA THEN BFLG=-1                  FC
·2330 RETURN                              IM
```

SAMPLER

```
·44 REM                                   JD
·45 REM..ADD THESE LINES TO               DL
```

```
·46 REM.. 'SPRITE CONTROLLER'                EA
·47 REM                                      JD
·49 REM=-=-=-=-=-=-=-=-=-=-=-=               NH
·50 REM=  SPRITE SAMPLER =                   BB
·51 REM=-=-=-=-=-=-=-=-=-=-=-=               NH
·55 REM=                                     MO
·60 REM= USE SPRITE LOADER                   DF
·65 REM=OR SPRITE MAKER/SAVER                IO
·70 REM= TO PUT SPRITE DATA                  IJ
·80 REM= INTO MEMORY FIRST                   HH
·85 REM                                      JD
·90 REM=SET MULTI-COLOR COLORS:              CA
·100 C1=15:C2=14:GOSUB 1700                  LL
·110 FOR SN=0 TO 2                           ND
·120 READ BK,CC,XX,YY                        JH
·130 GOSUB 500 :REM=SET PTR                  PK
·140 GOSUB 800 :REM=SET COLOR                NN
·150 GOSUB 600 :REM=SET X COORD              NL
·160 GOSUB 700 :REM=SET Y COORD              MN
·170 GOSUB 1100:REM=EXPAND X                 GO
·180 GOSUB 1300:REM=EXPAND Y                 JL
·190 GOSUB 1500:REM=MULTI-COLOR              BF
·200 GOSUB 1800:REM=CLR COLLISION            EE
·210 GOSUB 2100:REM=SET PRIORITY             NL
·220 GOSUB 900 :REM=TURN IT ON               MG
·230 NEXT SN                                 CE
·240 DATA 192,0,50,50                        KO
·250 DATA 193,1,100,100                      AF
·260 DATA 194,2,200,200                      CP
```

INSURANCE AGENT

FROM PAGE 102

```
·0 POKE53282,16:POKE53283,15:POKE53284,2:
 POKE53265,PEEK(53265)OR64                   AK
·1 POKE53281,7:POKE53280,7:PRINTCHR$(149)
 :PRINT"[CLEAR]"                             FO
·2 FORI=1TO8:PRINT:NEXT:PRINT"[5" "][RVSO
 N][c A][31"[s C]"][c S]"                    EK
·3 PRINT"[5" "][RVSON][s B][31" "][s B]"    PI
·4 PRINT"[5" "][RVSON][s B][7" "]LIFE INS
 URANCE NEEDS[4" "][s B]"                    FJ
·5 PRINT"[5" "][RVSON][s B][31" "][s B]"    PI
·6 PRINT"[5" "][RVSON][c Z][31"[s C]"][c
 X]":PRINT:PRINT                             OO
·7 PRINTTAB(5);"[RVSON]DO YOU WANT AN INT
 RODUCTION <Y/N>"                            NC
·8 GETS$:IFS$=""THEN8                        BO
·9 IFS$<>"N"ANDS$<>"Y"THEN7                  PF
·10 PRINT"[CLEAR]":POKE53281,7:POKE53280,
 7:PRINTCHR$(149):IFS$="Y"THENGOSUB5000      LB
·20 DR$="[RVSON][c A][33"[s C]"][c S]"       CE
·25 DV$="[RVSON][c Z][33"[s C]"][c X]"       DK
·30 DW$="[RVSON][s B][33" "][s B]"           HF
·31 IFX=1THENX=.:GOTO340                     CD
·32 RR$="[c A][33"[s C]"][c S]"              FB
·33 RV$="[c Z][33"[s C]"][c X]"              AH
·34 RW$="[s B][33" "][s B]"                  JM
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 59-61 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
·35 PRINTTAB(3);DR$:PRINTTAB(3)DW$           PN
·40 PRINT"[3" "][RVSON][s B][5" "]GROSS E
STATE ESTIMATES[6" "][s B]"                  MF
·50 PRINTTAB(3);DW$:PRINTTAB(3)DV$           DN
·65 PRINT:PRINT:PRINTTAB(3);RR$              DG
·70 PRINTTAB(3);"[s B][RVSON]NET WORTH PL
US INSURANCE PROCEEDS[RVSOFF][s B]"          NP
·75 PRINTTAB(3);RW$                          KD
·80 PRINTTAB(3);"[s B][5"+"][RVSON]1. $0[
7" "]TO $20,[3"0"] [RVSOFF][5"+"][s B]"      CP
·85 PRINTTAB(3);RW$                          KD
·90 PRINTTAB(3);"[s B][5"+"][RVSON]2. $20
,[3"0"[3" "]TO $200,[3"0"][RVSOFF][5"+"]
[s B]"                                       BC
·95 PRINTTAB(3);RW$                          KD
·100 PRINTTAB(3);"[s B][5"+"][RVSON]3. $2
00,[3"0"] TO OVER[4" "][RVSOFF][5"+"][s
B]"                                          DG
·105 PRINTTAB(3);RW$                         KD
·110 PRINTTAB(3);"[s B][5"+"][RVSON]4.[5"
"]END PROGRAM[5" "][RVSOFF][5"+"][s B]"      LD
·115 PRINTTAB(3);RW$                         KD
·120 PRINTTAB(3);"[s B][5"+"][RVSON][3" "
]PLEASE SELECT ONE[3" "][RVSOFF][5"+"][s
B]"                                          EL
·125 PRINTTAB(3);RW$                         KD
·130 PRINT"[3" "][s B][RVSON][33" "][RVSO
FF][s B]"                                    KL
·135 PRINTTAB(3);RV$                         KC
·140 GETS$:IFS$=""THEN140                    HE
·145 S=VAL(S$):IFS<1ORS>4THENPRINT"PLEASE
 ENTER A NUMBER 1-4":GOTO140                 KI
·150 IFS=4THENPRINT"[CLEAR]":FORI=1TO12:P
RINT:NEXT:PRINTTAB(8);"PLEASURE TO SERVE
 YOU"                                        LN
·155 IFS=4THENFORI=1TO2000:NEXT:PRINT"[CL
EAR]":END                                    IJ
·160 IFS=1THENGE=2200                        HB
·170 IFS=2THENGE=5000                        IL
·180 IFS=3THENGE=10000                       LL
·190 PRINT"[CLEAR]":PRINTTAB(3);DR$:PRINT
TAB(3);DW$                                   EJ
·220 PRINTTAB(3);"[RVSON][s B][8" "]NON-M
ORTGAGE DEBTS[7" "][s B]"                    BL
·230 PRINTTAB(3);DW$:PRINTTAB(3);DV$         GN
·240 PRINT:PRINT:PRINT                       EF
·250 DR$="[RVSON][c A][13"[s C]"][c S]":D
V$="[RVSON][c Z][13"[s C]"][c X]"            MC
·260 PRINTTAB(3);DR$;:PRINTTAB(23);DR$       JK
·270 PRINTTAB(3);"[RVSON][s B]  AUTO LOAN
   [s B]";:PRINTTAB(23);"[RVSON][s B]CRED
IT-CARDS [s B]"                              IJ
·280 PRINTTAB(3);DV$;:PRINTTAB(23);DV$:PR
```

```
INT:PRINT:PRINT                              NM
·290 PRINTTAB(3);DR$;:PRINTTAB(23);DR$:PR
INTTAB(3);"[RVSON][s B]PERSONAL NOTE[s B
]";                                          CE
·300 PRINTTAB(23);"[RVSON][s B]MISCELLANO
US [s B]":PRINTTAB(3);DV$;:PRINTTAB(23);
DV$                                          IC
·301 PRINT:PRINT:PRINT:PRINTTAB(3);"[RVSO
N][c A][33"[s C]"][c S]"                     HC
·303 PRINTTAB(3);"[RVSON][s B]  PLEASE EN
TER AMOUNT AT PROMPT  [s B]"                 IG
·305 PRINTTAB(3)"[RVSON][c Z][33"[s C]"][
c X]"                                        CG
·310 INPUT"[11"[UP]"[4"[RIGHT]"[3"="]>$";
AL:INPUT"[UP][23"[RIGHT]"[3"="]>$";CC        AG
·320 INPUT"[5"[DOWN]"[4"[RIGHT]"[3"="]>$"
;PN:INPUT"[UP][23"[RIGHT]"[3"="]>$";MC       CL
·330 NM=AL+CC+PN+MC:PRINT"[CLEAR]":X=1:GO
TO20                                         OJ
·340 PRINT:PRINTTAB(3);DR$:PRINTTAB(3);DW
$                                            PD
·350 PRINTTAB(3);"[RVSON][s B][10" "]EMER
GENCY FUND[9" "][s B]":PRINTTAB(3)DW$        OM
·360 PRINTTAB(3);DV$:PRINT:PRINT"[3" "[36
"+"]"                                        OC
·362 PRINTTAB(3);"+";:PRINTTAB(37);"+"       DF
·365 PRINTTAB(3);"+ESTIMATE TWO MONTHS TA
KE HOME PAY+"                                FJ
·370 PRINTTAB(3);"+";TAB(37);"+":PRINTTAB
(3);"+[10" "]FOR A RESERVE";                 BM
·375 PRINTTAB(37);"+":PRINTTAB(3);"[35"+"
]"                                           AG
·380 PRINT:PRINT:PRINTTAB(3);DR$:PRINTTAB
(3);DW$                                      PL
·390 PRINTTAB(3);"[RVSON][s B]  TOTAL INV
ESTED ASSETS ON HAND  [s B][RVSOFF]":PRI
NTTAB(3)DW$                                  IP
·400 PRINTTAB(3)DV$:INPUT"[7"[UP]"[14"[RI
GHT]"[3"="]>$";MP                            JA
·410 INPUT"[7"[DOWN]"[14"[RIGHT]"[3"="]>$
";IA:PRINT"[CLEAR]":PRINTTAB(3);DR$:PRIN
TTAB(3);DW$                                  OH
·420 PRINTTAB(3);"[RVSON][s B][10" "]COLL
EGE FUND[11" "][s B]":PRINTTAB(3);DW$        ON
·430 PRINTTAB(3);DV$:PRINT:PRINTTAB(3);"[
35"+"]"                                      EC
·440 PRINTTAB(3);"+ THIS ASSUMES 9,[3"0"]
/YEAR PRIVATE +":PRINTTAB(3);"+";            NB
·450 PRINT" 4,900/YEAR STATE-PUBLIC COLLE
GE +":PRINTTAB(3);"+[6" "]ROOM - ";          CD
·460 PRINT"BOARD - TUITION[5" "]+":PRINT"
[3" "[36"+"]"                                MJ
·470 PRINT:PRINTTAB(3);RR$:PRINTTAB(3);"[
s B][5"+"]1. PRIVATE  UNIV";                 IM
·480 PRINT"ERSITY[6"+"][s B]":PRINTTAB(3)
;"[s B][5"+"]2. PUBLIC[3" "]UNIVERSITY[6
"+"][s B]"                                   KL
·490 PRINTTAB(3);"[s B][5"+"]3. PLEASE  S
ELECT  ONE[6"+"][s B]":PRINTTAB(3);RV$:P
RINT                                         FC
·500 GETC$:IFC$=""THEN500                    FM
·510 IFC$<"1"ORC$>"2"THEN500                 HI
·520 IFC$="1"THENC=9600                      HO
·530 IFC$="2"THENC=4900                      JN
·540 PRINTTAB(3)"[s B] NO OF CHILDREN TO
ATTEND [s B]"                                LM
·550 PRINTTAB(3);"[s B] TOTAL YEARS TO AT
TEND[4" "][s B]"                             CH
·560 INPUT"[UP][UP][31"[RIGHT]"]";NC         MG
·570 INPUT"[31"[RIGHT]"]";TY                 AD
·580 T1=(C*NC)*TY:PRINT"[CLEAR]":PRINT:PR
INT:PRINTTAB(3);DR$:PRINTTAB(3);DW$          EJ
·590 PRINTTAB(3);"[RVSON][s B] EXPECTED A
NNUAL LIVING EXPENSES [s B]":PRINTTAB(3)
;DW$                                         GF
·600 PRINTTAB(3);DV$:PRINT:PRINT:PRINTTAB
(3);DR$:PRINTTAB(3);DW$                      DM
·610 PRINTTAB(3)"[RVSON][s B] SPOUSE'S AV
ERAGE ANNUAL INCOME  [s B]":PRINTTAB(3);
DW$                                          PK
·620 PRINTTAB(3);DV$:PRINT:PRINT:PRINTTAB
(3);DR$:PRINTTAB(3);DW$                      DM
·630 PRINTTAB(3);"[RVSON][s B] ANNUAL SOC
IAL SECURITY BENEFITS [s B]":PRINTTAB(3)
;DW$                                         EE
·640 PRINTTAB(3);DV$:INPUT"[14"[UP]"[14"[
RIGHT]"[3"="]>$";EL                          DC
·650 INPUT"[6"[DOWN]"[14"[RIGHT]"[3"="]>$
";AI:INPUT"[6"[DOWN]"[14"[RIGHT]"[3"="]>
$";SS                                        GJ
·660 LE=EL-AI-SS:PRINT"[CLEAR]":FORI=1TO9
:PRINT:NEXT:PRINTTAB(3);DR$:PRINTTAB(3);
DW$                                          CE
·670 PRINTTAB(3);"[RVSON][s B] NO OF YEAR
S UNTIL SPOUSE IS 90  [s B]"                 PK
·680 PRINTTAB(3);"[RVSON][s B][5" "]INVES
TMENT RATE FACTOR[6" "][s B]":PRINTTAB(3
);DW$                                        FM
·690 PRINTTAB(3);DV$:PRINT:PRINTTAB(12);"
==>";:INPUTYR                                HL
·700 PRINT"[CLEAR]"                          HH
·710 PRINTTAB(10);"[s N]  INVESTMENT RATE
 FACTOR  [s N]"                              KK
·720 PRINTTAB(9);"[s N][26"[c T]"][s N]"     IC
·730 PRINTTAB(8);"[s N]  S[5" "][s N] *A*
 E  [s N] *B*[4" "][s N]"                    DA
·740 PRINTTAB(7);"[s N]  R[5" "][s N][5"
"]V  [s N][8" "][s N]"                       JA
·750 PRINTTAB(6);"[s N]  A[5" "][s N]  T
 I  [s N]  T  E  [s N]"                      HJ
·760 PRINTTAB(5);"[s N]  E[5" "][s N]  N
 T  [s N]  N  V  [s N]"                      MK
·770 PRINTTAB(4);"[s N]  Y  0  [s N]  E
A  [s N]  E  I  [s N]"                       OE
·780 PRINTTAB(3);"[s N][5" "]9  [s N]  M
 V  [s N]  M  S  [s N]"                      LF
```

```
·790 PRINTTAB(2);"[s N]  R[5" "][s N]  T
  R  [s N]  T  S  [s N]"                AJ
·800 PRINTTAB(1);"[s N]  E  L  [s N]  S
 E  [s N]  S  E  [s N]"                 OH
·810 PRINT"[c N]  B  I  [c N]  E  S  [c N
 ]  E  R  [c N]":PRINT"[c N]  M  T  [c N]
   V  N  [c N]  V  G  [c N]"            MP
·820 PRINT"[c N]  U  N  [c N]  N  O  [c N
 ]  N  G  [c N]":PRINT"[c N]  N  U  [c N]
   I  C  [c N]  I  A  [c N]"            FB
·830 PRINT"[c N][26"[c Y]"][s P]":PRINT"[
 c N][3" "]25[3" "][c N][3" "]20[3" "][c
 N][3" "]16[3" "][c N]"                 IN
·840 PRINT"[c N][3" "]30[3" "][c N][3" "[
 3"2"[4" "][c N][3" "]17[3" "][c N]":PRIN
 T"[c N][3" "]35[3" "][c N][3" "]25[3" "]
 [c N][3" "]19[3" "][c N]"              MP
·850 PRINT"[c N][3" "]40[3" "][c N][3" "]
 27[3" "][c N][3" "]20[3" "][c N]":PRINT"
 [c N][3" "]45[3" "][c N][3" "]30[3" "][c
  N][3" "]21[3" "][c N]"                AD
·860 PRINT"[c N][3" "]50[3" "][c N][3" "]
 31[3" "][c N][3" "]21[3" "][c N]":PRINT"
 [c N][3" "[3"5"[4" "][c N][3" "[3"3"[4"
 "][c N][3" "[3"2"[4" "][c N]"          PJ
·870 PRINT"[c N][3" "]60[3" "][c N][3" "]
 35[3" "][c N][3" "]23[3" "][c N]":PRINT"
 [c N][26"[c P]"][s @]"                 HE
·875 PRINT"[11"[UP]"[30"[RIGHT]"]FIND YEA
 RS"                                    NE
·876 PRINT"[29"[RIGHT]"]PICK FROM"      GF
·877 PRINT"[29"[RIGHT]"]A OR B"         KN
·880 INPUT"[30"[RIGHT]"[3"="]>";FI      PO
·890 TL=LE*FI:PRINT"[CLEAR]"            LM
·895 TN=GE+NM+MP+T1+TL                  AF
·900 PRINT"[39"+"]"                     IE
·910 PRINT"+[4" "][RVSON][30" "][RVSOFF][
 3" "]+"                                OI
·920 PRINT"+[4" "][RVSON]  YOUR LIFE INSU
 RANCE NEEDS[3" "][RVSOFF][3" "]+"      GA
·930 PRINT"+[4" "][RVSON][30" "][RVSOFF][
 3" "]+"                                OI
·945 PRINT"[39"+"]":PRINT               FK
·955 PRINT"+ 1. FUNERAL/ESTATE TAXES/ETC.
 ";GE                                   MA
·960 PRINT"+ 2. SETTLE NON-MORTGAGE DEBTS
  ";NM                                  HK
·965 PRINT"+ 3. EMERGENCY FUND[12" "]";MP DI
·970 PRINT"+ 4. COLLEGE FUND[14" "]";T1   FP
·980 PRINT"+ 5. EXPECTED LIVING EXPENSES" GE
·990 PRINT"+[4" "]A. AVG. ANNUAL LIVING E
 XP.";EL                                NG
·1000 PRINT"+[4" "]B. SPOUSE'S AVG. INCOM
 E[3" "]";AI                            JD
·1010 PRINT"+[4" "]C. ANNUAL SOCIAL SECUR
 ITY ";SS                               JO
·1020 PRINT"+[4" "]D. NET ANNUAL LIVING E
 XP. ";LE                               EB
·1030 PRINT"+[4" "]E. YEARS UNTIL 90[9" "
 ]";YR                                  NK
·1040 PRINT"+[4" "]F. INVESTMENT RATE FAC
 TOR ";FI                               GI
·1050 PRINT"+[4" "]G. TOTAL LIVING EXP.[6
 " "]";TL                               MJ
·1060 PRINT"+ 6. TOTAL MONETARY NEEDS[6"
 "]";TN                                 EL
·1070 PRINT"+ 7. TOTAL INVESTMENT ASSETS[
 3" "]";IA                              LD
·1075 LN=TN-IA                          BO
·1080 PRINT"+ 8. LIFE INSURANCE NEEDS[6"
 "]";LN                                 JO
·1090 PRINT"[39"+"]"                    IE
·1100 PRINT:PRINT"[7" "][RVSON]PRESS ANY
 KEY TO CONTINUE"                       IE
·1110 GETKE$:IFKE$=""THEN1110           CE
·1120 PRINT"[CLEAR]":GOTO35             KE
·5000 PRINT"[CLEAR]":PRINT"[4" "]IS YOUR
 LIFE INSURANCE SUFFICIENT--  OR IS IT MO
 RE";                                   CO
·5010 PRINT" THAN YOU NEED?"            KN
·5020 PRINT:PRINT"[4" "]THE BEST WAY TO T
 ELL IS TO CALCULATE WHAT YOUR FAMILY";  KI
·5030 PRINT" WOULD REQUIRE IF YOU[3" "]DI
 ED TODAY.":PRINT                       IA
·5040 PRINT"[4" "]INSURANCE NEEDS ARE NO
 LONGER BASED  ON A MULTIPLE OF YOUR";   BN
·5050 PRINT" SALARY. INSURANCE NEEDS USUA
 LLY PEAK EARLY IN YOUR CAREER";         ED
·5060 PRINT" AND THEN DECLINE AS YOU MOVE
  TOWARD[5" "]RETIREMENT, EVEN TO BEING"; DH
·5070 PRINT" SELF INSURED."             JP
·5080 PRINT"[4" "]USING THIS PROGRAM YOU
 WILL BE ASKED VARIOUS QUESTIONS, TO";   JA
·5090 PRINT" IDENTIFY SUMS TO  BE PAID OR
  SAVED, THEN CALCULATE THE[4" "]FAMILIES
 ";                                     NO
·5100 PRINT" POTENTIAL INCOME AND LIVING[
 4" "]EXPENSES.  THIS AMOUNT IS REDUCED"; EJ
·5110 PRINT" BY[4" "]INVESTING THE LIFE I
 NSURANCE PROCEEDS.":PRINT              ND
·5115 PRINT"[7" "][RVSON]<PRESS ANY KEY T
 O CONTINUE>[RVSOFF]"                   AM
·5116 GETK$:IFK$=""THEN5116             KJ
·5117 PRINT"[CLEAR]"                    HH
·5120 PRINT"[4" "]THE TOTAL";           BO
·5130 PRINT" INSURANCE NEEDED IS FOUND BY
  ADDING THE IMMEDIATE AND LONG--";      EK
·5140 PRINT"TERM  EXPENSES AND SUBSTRACTI
 NG THE VALUE OF  INVESTMENT ASSETS";    DD
·5150 PRINT" ON HAND.":PRINT:PRINT"[4" "]
 TO ESTIMATE SOCIAL SECURITY BENEFITS";  IF
·5160 PRINT"YOU SHOULD USE $5,[3"0"] IF Y
 OU HAVE TWO[3" "]OR MORE MINOR CHILDREN.
 ";                                     FM
·5170 PRINT" USE $4,[3"0"] FOR  ONE CHILD
  AND $3,[3"0"] FOR NO CHILDREN.":PRINT  BJ
```

```
•5180 PRINT"[4" "]A WORK SHEET PROVIDES A
 CHOICE OF[3" "]TWO INVESTMENT RATE FACT
ORS";                                      KO
•5190 PRINT" YOU CAN USE TO FIGURE IN THE
 POTENTIAL EARNINGS[5" "]FROM INVESTING"
;                                          MF
•5200 PRINT" THE INSURANCE PROCEEDS.  1.
A CONSERVATIVE PORTFOLIO SUCH AS BANK";    AB
•5210 PRINT"ACCOUNTS AND BONDS (2% REAL G
ROWTH AFTERINFLATION AND TAXES) OR";       GB
•5220 PRINT" 2. A MORE AGGRESSIVE INVESTM
ENT SUCH AS STOCKS AND REAL ESTATE";       DE
•5230 PRINT" THAT MIGHT YIELD 4% REAL GRO
WTH."                                      CL
•5240 PRINT:PRINT"[7" "][RVSON]<PRESS ANY
 KEY TO CONTINUE>[RVSOFF]"                 FE
•5250 GETK$:IFK$=""THEN5250                LE
•5260 PRINT"[CLEAR]":RETURN                DG
•5300 REM******************************    CE
•5301 REM* BASED ON AN ARTICLE IN 'WALL    EC
•5302 REM* STREET JOURNAL' BY KAREN        OP
•5303 REM* SLATER...."CHANGING LIFE-       CM
•5304 REM* INSURANCE NEEDS REQUIRE         LK
•5305 REM* PERIODIC LOOK AT YOUR FAMILY'S  CA
•5306 REM* COVERAGE"[4"."]SOURCE: BAILARD
,                                          OD
•5307 REM* BIEHL & KAISER INC., SAN        EK
•5308 REM* MATEO, CALIF.                   PI
•5309 REM* PROGRAM BY GLENN LUMPKINS       MK
•5310 REM* WRITTEN APRIL, 1984 V3          BB
•5311 REM******************************    CE
```

VIC ERASER

FROM PAGE 49

```
•10 DIMDL$(150):II=1:GOTO210               IL
•20 REM BY JOHN STILWELL 5/31/83 REVISION
 2 ON 1/8/84 **************                CP
•30 CLR:DIMDL$(150):PRINT"[CLEAR][BLACK][
RVSON]* ERASER IS SCANNING [7"*"] THE DI
SC [6"*"]":II=0                            KI
•40 OPEN1,8,0,"$0"                         GF
•50 GET#1,A$,B$                            AK
•60 GET#1,A$,B$                            AK
•70 GET#1,A$,B$                            AK
•80 C=0                                    CM
•90 IF A$<>""THENC=ASC(A$)                 KG
•100 IF B$<>""THENC=C+ASC(B$)*256          HF
•110 D$=D$+"[RVSON]"+MID$(STR$(C),2)+"[RV
SOFF]"                                     AP
•120 GET#1,B$:IFST<>0THENCLOSE1:GOTO210    ED
•130 IF B$<>CHR$(34)THEN120                DC
•140 GET#1,B$:IF B$<>CHR$(34)THEND$=D$+B$
:GOTO140                                   IH
•150 GET#1,B$:IFB$=CHR$(32)THEN150         DJ
•160 C$=""                                 GB
•170 C$=C$+B$:GET#1,B$:IFB$<>""THEN170     JI
•190 I=II:DL$(II)=D$:GOSUB705              FC
•194 A$="":FORK=1TO6-LEN(G$):A$=A$+" ":NE
XTK                                        CO
•195 DL$(II)=G$+A$+F$:D$=""                LD
•197 IFII=0THENGOSUB705:DL$(0)=F$:PRINT"D
ISK IS:"DL$(0)                             GO
•198 II=II+1:GOTO60                        OJ
•200 REM ROLLO DEX ********************** HJ
•210 I=1                                   CJ
•215 PRINT"[CLEAR]"                        HH
•220 PRINT"[HOME][RVSON][PURPLE]PUSH S TO
 SCRATCH[BLUE][5" "]F1-UP, F7-DOWN, L-LO
ADV-VERIFY,";:K=0                          NO
•223 PRINT"[4" "]R-RENAME,W-WHY,[3" "]F-F
ORMAT DISKP-PRINTOUT,  A-AUTORUN"          HJ
•225 PRINT"[BLACK]THERE ARE[6" "[7"[LEFT]
"]"II-1"ENTRIES[15" "][DOWN]"              OM
•230 PRINT"[21" "][UP]":IFK<>0THENPRINT"
";:GOTO250                                 JH
•240 PRINT">";                             FI
•250 PRINTDL$(I+K):K=K+1                   FC
•260 IFK+I>II+1ORK+I>I+12THEN266           DL
•265 GOTO230                               CF
•266 IF(I+K)<(I+12)THENFORJ=(I+K)TO(I+12)
:PRINT"[21" "]":NEXTJ                      KN
•270 GETA$:IFA$=""THEN270                  HE
•280 IFA$="S"THEN350                       HF
•285 IFA$="A"THEN940                       HC
•290 IFA$="[F1]"ANDI>1THENI=I-1:GOTO220    EH
•300 IFA$="[F7]"ANDI<II-1THENI=I+1:GOTO22
0                                          EI
•310 IFA$="L"THEN30                        FK
•315 IFA$="W"THEN490                       JO
•320 IFA$="V"THEN400                       HE
•323 IFA$="P"THEN720                       HH
•325 IFA$="R"THEN420                       HK
•327 IFA$="F"THEN550                       GA
•330 GOTO270                               CJ
•340 REM SCRATCH *******                   JL
•350 PRINT"[GREEN][HOME][6"[DOWN]"]SCRATC
H IT?[10" "][BLACK]"                       KA
•351 GETA$:IFA$=""THEN351                  HG
•352 IFA$<>"Y"THEN220                      FB
•353 IFDL$(I)=""THEN220                    BE
•355 GOSUB705                              CK
•370 OPEN15,8,15:PRINT#15,"S0:"+F$:CLOSE1
5                                          MI
•380 II=II-1:DL$(II+1)="":FORJ=ITOII:DL$(
J)=DL$(J+1):NEXTJ:GOTO220                  OJ
•390 REM VERIFY ********                   ND
•400 PRINT"[CLEAR][RVSON]  VERIFING THE D
ISC[3" "]":OPEN15,8,15,"V":CLOSE15:GOTO2
20                                         MA
•410 REM RENAME **************************
****                                       EE
•420 IFDL$(I)=""THEN270                    BF
•430 F$=RIGHT$(DL$(I),LEN(DL$(I))-6)       EG
•440 PRINT"[HOME][5"[DOWN]"][PURPLE][RVSO
N][3"*"[3" "]RENAME [3"*"]":NN$="":PRINT
```



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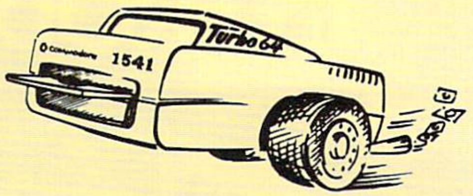
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Disk Match-Compare any two diskettes. Byte for Byte.

New Wedge-Easier to use DOS wedge.

ID Check-Check ID's on **any** track.

Unscratch-Restore a scratched file.

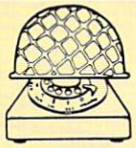
View RAM-Visual display of the free and used sectors on a diskette.

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```
"WHAT'S THE NEW NAME":INPUTNN$                IA
·450 PRINT"[HOME][BLACK]":IFNN$=""THEN215     EJ
·460 OPEN15,8,15:PRINT#15,"R0:"+NN$+"="+F
$:CLOSE15                                     EK
·470 DL$(I)=LEFT$(DL$(I),6)+NN$:GOTO215       CF
·480 REM WHAT THE DISK ERROR IS               AD
·490 OPEN15,8,15:INPUT#15,A$,B$,C$,D$:PRI
NT"[CLEAR][RVSON]WHAT IS WRONG":CLOSE15       LB
·500 PRINTA$:PRINTB$:PRINTC$:PRINTD$          ML
·510 PRINT"[DOWN][DOWN][RVSON]PUSH ANY KE
Y"                                            EL
·520 GETA$:IFA$=""THEN520                     IC
·530 GOTO215                                  CC
·540 REM NEW THE DISK                         IA
·550 PRINT"[CLEAR][RVSON]FORMAT THE DISK"
:PRINT"[DOWN]THIS WILL ERASE THE[3" "]EN
TIRE DISK"                                    HI
·560 FORI=24TO31:FORJ=1TO50:POKE36879,I:N
EXTJ,I                                        OD
·570 PRINT"[DOWN][DOWN]ARE YOU SURE YOU W
ANT TO DO THIS?":POKE198,0                    FG
·580 GETA$:IFA$=""THEN580                     JI
·590 IFA$<>"Y"THEN215                         EP
·600 PRINT"[DOWN][DOWN]WHAT IS THE DISK'S
 NEW NAME":INPUTN$:IFN$=""THEN215             LC
·610 A$=CHR$(INT(RND(.)*26)+65)               JN
·620 B$=CHR$(INT(RND(.)*26)+65)               KC
·630 CLOSE15:OPEN15,8,15,"N0:"+N$+","+A$+
B$:CLOSE15:SAVE"ERASER",8:CLR:GOTO10          ME
·690 REM LOAD ROUTINE                         NA
·705 F$=DL$(I):FORK=1TO9:IFMID$(F$,K,1)="
[RVSOFF]"THENJ=K:K=9                          CF
·710 NEXTK:G$=LEFT$(F$,J):F$=RIGHT$(F$,LE
N(F$)-J)                                      AE
·715 IFMID$(F$,1,1)=" "THENF$=RIGHT$(F$,L
EN(F$)-1):GOTO715                             CE
·717 RETURN                                   IM
·720 REM PRINTOUT ROUTINE *************** HH
·730 PRINT"[HOME][6"[DOWN]"]ARE YOU SURE?
[7" "]"                                       HB
·740 GETA$:IFA$=""THEN740                     JO
·750 IFA$<>"Y"THEN215                         EP
·755 IFII=1THEN220                            EJ
·757 PRINT"[HOME][6"[DOWN]"]PUSH ANY KEY
TO PAUSE"                                     PH
·760 OPEN4,4:PRINT#4,"[10" "]"+CHR$(14)+D
L$(0)+CHR$(15)                                JH
·770 FORI=1TOII-1                             MN
·772 GETA$:IFA$=""THEN780                     JK
·775 PRINT"[HOME][6"[DOWN]"][RVSON][PURPL
E]DO YOU WANT TO ABORT?[BLACK]"               AB
·777 GETA$:IFA$=""THEN777                     KC
·778 IFA$="Y"THENI=II-1:GOTO790               NP
·779 PRINT"[HOME][4"[DOWN]"]PUSH ANY KEY
TO PAUSE"                                     HK
·780 PRINT#4,"[8" "]"+DL$(I)                  DD
·790 NEXT:CLOSE4                              JJ
·800 GOTO210                                  BP
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 59-61 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

```
·900 FORI=1TOII-1:F$=DL$(I):GOSUB705          BD
·910 A$="":FORJ=1TO6-LEN(G$):A$=A$+" ":NE
XTJ                                           PE
·920 DL$(I)=G$+A$+F$:NEXTI:RETURN             GI
·930 REM LOAD & RUN THE PROGRAM               PJ
·940 F$=RIGHT$(DL$(I),LEN(DL$(I))-6):PRIN
TF$                                           HL
·950 PRINT"[CLEAR][3"[DOWN]"]LOAD";CHR$(3
4);F$;CHR$(34);",8"                           MH
·955 PRINT"RUN"                               NC
·960 PRINT"[7"[DOWN]"]RUN":PRINT"RUN[HOME
]"                                            HA
·970 FORI=631TO636:POKEI,13:NEXT:POKE198,
6:END                                         JF
```

FONTASIA

FROM PAGE 26

```
·1 REM ***     PRINTER FORMAT PGR      ***    AA
·2 REM ***   EPSON CARD/?+G FORMAT     ***    AB
·3 REM ***    WRITTEN BY JOHN LAWS     ***    JA
·4 REM ***       SEPT 16, 1984         ***    EC
·5 REM *******************************        DD
·10 PRINT"[CLEAR]"SPC(7)"PRINTER FORMAT P
ROGRAM[DOWN]"      "                          CD
·20 PRINTSPC(9)"[RVSON]1[RVSOFF] ELITE PR
INT[DOWN]"                                    KI
·30 PRINTSPC(9)"[RVSON]2[RVSOFF] CONDENSE
D PRINT[DOWN]"                                HH
·40 PRINTSPC(9)"[RVSON]3[RVSOFF] ITALICS
PRINT[DOWN]"                                  DD
·50 PRINTSPC(9)"[RVSON]4[RVSOFF] EMPHASIZ
ED PRINT[DOWN]"                               FF
·60 PRINTSPC(9)"[RVSON]5[RVSOFF] ENLARGED
 PRINT[DOWN]"                                 HL
·70 PRINTSPC(9)"[RVSON]6[RVSOFF] DOUBLE S
TRIKE PRINT[DOWN]"                            OB
·80 PRINTSPC(9)"[RVSON]7[RVSOFF] SET LINE
 SPACING[DOWN]"                               FF
·90 PRINTSPC(9)"[RVSON]8[RVSOFF] SET LEFT
 MARGIN[DOWN]"                                MM
·100 PRINTSPC(9)"[RVSON]9[RVSOFF] IGNORE
PAPER END[DOWN]"                              CN
·105 PRINTSPC(9)"[RVSON]10[RVSOFF] SET FO
RM LENGTH[DOWN]"                              AM
·107 PRINTSPC(9)"[RVSON]11[RVSOFF] SET SK
IP-OVER PERFORATION[DOWN]"                    NL
·110 PRINTSPC(10);:INPUT"YOUR CHOICE";K$:
IFK$=""THEN110                                CG
·120 K=VAL(K$):IFK <1 OR K >11 THEN 110       KC
·130 OPEN4,4,0:ON K GOSUB200,250,300,350,
400,450,500,600,650,700,850                   KF
```

```
·140 PRINT#4:CLOSE4:PRINT"[CLEAR][DOWN][5
 "[RIGHT]"]CHANGE ANOTHER FUNCTION (Y/N)" FG
·150 GETK$:IFK$=""THEN150                 GJ
·160 IFK$<>"Y" AND K$<>"N"THEN150         KE
·170 IFK$="Y"THEN10                       FF
·180 END                                  IC
·200 PRINT#4,CHR$(27);CHR$(77);"ELITE MOD
E":RETURN                                 CG
·250 PRINT#4,CHR$(27);CHR$(20);"CONDENSED
 MODE":RETURN:REM CARD+G CHANGES TO 15    IP
·300 PRINT#4,CHR$(27);CHR$(52);"ITALICS M
ODE":RETURN                               JE
·350 PRINT#4,CHR$(27);CHR$(69);"EMPHASIZE
D MODE":RETURN                            PP
·400 PRINT#4,CHR$(27);CHR$(87);CHR$(1);"E
NLARGED MODE":RETURN                      AM
·450 PRINT#4,CHR$(27);CHR$(71);"DOUBLE ST
RIKE MODE":RETURN                         GO
·500 PRINT"[CLEAR][DOWN]"SPC(9)"YOUR CHOI
CES ARE: [DOWN]":PRINTSPC(9)"[RVSON]1[RV
SOFF] 7/72 IN SPACING[DOWN]"              JJ
·501 PRINTSPC(9)"[RVSON]2[RVSOFF] 1/8 IN
SPACING (9/72)[DOWN]":PRINTSPC(9)"[RVSON
]3[RVSOFF] 1/6 IN SPACING (12/72)[DOWN]" CF
·502 PRINTSPC(9)"[RVSON]4[RVSOFF] N/72 IN
 SPACING[DOWN]"                           JH
·503 GETK$:IFK$=""THEN503                 HB
·504 K=VAL(K$):IFK <1 OR K >4 THEN 503    FH
·505 ON K GOTO 590,580,570,510            PN
·506 GOTO503                              CK
·510 INPUT"[DOWN][RIGHT][RIGHT]WHAT VALUE
 DO YOU WANT TO GIVE N";N                 ML
·520 IF N=0 THEN510                       DA
·530 PRINT#4,CHR$(27);CHR$(65);CHR$(N);N;
"/72 IN. LINE":PRINT#4,"SPACING SET"      IA
·531 RETURN                               IM
·570 PRINT#4,CHR$(27)CHR$(50);"1/6 IN. (1
2/72) LINE":PRINT#4,"SPACING SET":RETURN EC
·580 PRINT#4,CHR$(27);CHR$(48);"1/8 IN. (
9/72) LINE":PRINT#4,"SPACING SET":RETURN JE
·590 PRINT#4,CHR$(27);CHR$(49);"7/72 IN.
LINE":PRINT#4,"SPACING SET":RETURN        JP
·600 PRINT"[CLEAR][DOWN]WHAT COLUMN DO YO
U WANT LEFT MARGIN":PRINTSPC(15);:INPUT
N                                         GI
·605 PRINT#4:CLOSE4:OPEN4,4,4:REM TRANSPA
RENT MODE ON STAR IS 4,4,6                AJ
·610 PRINT#4,CHR$(27);CHR$(108);CHR$(N);"
LEFT MARGIN IS";N:RETURN                  CI
·650 PRINT#4,CHR$(27);CHR$(56);"IGNORE PA
PER-END SIGNAL":RETURN                    DJ
·700 PRINT"[CLEAR][DOWN][DOWN][RIGHT]DO Y
OU WISH TO SET THE FORM LENGTH BY[DOWN]" FG
·710 PRINTSPC(9);"[RVSON]1[RVSOFF] NUMBER
 OF LINES[DOWN]"                          OI
·720 PRINTSPC(9);"[RVSON]2[RVSOFF] BY INC
H LENGTH[DOWN]"                           LB
·730 GETK$:IFK$=""THEN730                 GN
·740 K=VAL(K$):IFK<>1 AND K<>2 THEN 730   LE
·750 IF K=2 THEN 800                      FJ
·760 PRINT"[DOWN]"SPC(9);:INPUT"HOW MANY
LINES PER PAGE";N                         OG
·770 PRINT#4,CHR$(27);CHR$(67);CHR$(N);"F
ORM LENGTH IS"N"LINES PER PAGE":RETURN    HN
·800 PRINT"[DOWN]"SPC(9);:INPUT"HOW MANY
INCHES PER PAGE";N                        NP
·810 PRINT#4,CHR$(27);CHR$(67);CHR$(0);CH
R$(N);"FORM LENGTH IS"N"INCHES PER PAGE" GB
·820 RETURN                               IM
·850 PRINT"[CLEAR][DOWN]HOW MANY LINES TO
 SKIP ON BOTTOM OF PAGE":INPUT N          MO
·860 PRINT#4,CHR$(27);CHR$(78);CHR$(N);"S
KIP-OVER PERFORATION SET                  KJ
·870 PRINT#4,"WITH"N"LINES AT BOTTOM OF P
AGE BEING LEFT BLANK":RETURN              OA
```

VIC 20 BUG REPELLENT LINE CODES FOR FONTASIA

LN# 1 :ED	LN# 50 :DD	LN# 120:AD	LN# 300:KC	LN# 505:BJ	LN# 600:CM	LN# 750:PJ
LN# 2 :AG	LN# 60 :JP	LN# 130:HC	LN# 350:NF	LN# 506:CK	LN# 605:PH	LN# 760:DA
LN# 3 :MD	LN# 70 :NM	LN# 140:HM	LN# 400:OO	LN# 510:JD	LN# 610:CA	LN# 770:MI
LN# 4 :JB	LN# 80 :IH	LN# 150:GJ	LN# 450:KG	LN# 520:AE	LN# 650:NK	LN# 800:NF
LN# 5 :PC	LN# 90 :HP	LN# 160:GC	LN# 500:PA	LN# 530:HG	LN# 700:IB	LN# 810:LK
LN# 10:EO	LN# 100:OG	LN# 170:FF	LN# 501:PM	LN# 531:IM	LN# 710:NB	LN# 820:IM
LN# 20:OH	LN# 105:NP	LN# 180:IC	LN# 502:AJ	LN# 570:KG	LN# 720:FF	LN# 850:EO
LN# 30:IO	LN# 107:IJ	LN# 200:BI	LN# 503:HB	LN# 580:DO	LN# 730:GN	LN# 860:GE
LN# 40:JI	LN# 110:BC	LN# 250:EK	LN# 504:OE	LN# 590:OB	LN# 740:OI	LN# 870:LI

Continued from page 12

Also from CDA, the *Micro Kitchen Companion* (designed to read and manipulate their *Cookbooks-on-Disk*) provides scaling up and down for serving size and 14 search criteria. Price of the C-64 disk is $39.95, which includes a free *Cookbook-on-Disk* (usually retailing for $14.95).

Concept Development Associates, Inc., 7960 Old Georgetown Road–Suite 2D, Bethesda, MD 20814 (phone: 301-951-0997).

Recipes Supreme from Melcher Software includes 40 recipes and allows the user to add his own. Search by ingredient and adjustment for serving size are included. C-64 disk is $19.95 plus $3.00 postage.

Melcher Software, P.O. Box 213, Midland, MI 48640 (phone: 517-631-7607).

WINTER GAMES

Two more war games from the dogfaces at SSI, both on C-64 disk, both $39.95:

Field of Fire retraces eight WWII battles fought by the First Infantry Division's Easy Company in North Africa and Europe. You must apply such military concepts as concentration of force, cover fire, flanking, and selective maneuver to defeat your computer-directed enemy.

Imperium Galactum lets you strive for bigger stakes: an expanse of 50 solar systems. As the master of an industrial world you oppose up to three players in your attempt to increase the population of your superior race through colonization and conquest.

Strategic Simulations Inc., 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043-1983 (phone: 415-964-1353).

Based on the laws of probability, *Mariah* centers around the myth of Crismel, who tried to gain control of the wind and thereby the world. You may play against the computer or up to nine other players. For the C-64; $33.50.

New Leaf Inc., 120 Lynnhaven, Belleview, IL 62223 (phone: 618-397-3660).

Broderbund's *Karateka* ($34.95) pits a young karate master against the evil warlord who has imprisoned his bride-to-be. You joystick-control him through battles with a succession of warriors, while watching out for assorted dangers. For the 64.

Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101 (phone: 415-479-1170).

On-Court Tennis provides full racquet control over groundstrokes (angle and spin), serves, lobs, and smashes, and allows you the choice of playing a human opponent or one of four computer-provided challengers. For the C-64; $31.95.

Gamestar, Inc., 1302 State Street,

Santa Barbara, CA 93101 (phone: 805-963-3487).

HesGames, mentioned here in December, has been reacquired by 3-2-1 Software, who have changed the name to *S-Games* and dropped the price to $14.95. Distributor is Data Northwest, 3831 Stoneway North, Seattle, WA 98103 (phone: 206-633-0524).

EDUCATE YOUR MIND

Two additions to Orbyte's ChallengeWare series, both on C-64 disk, both $29.95:

Jigsaw Joggle lets the child study and then attempt to reassemble 16 pictures, ranging from storybook drawings to famous masterpieces.

History Flash allows two players to compete in answering questions on American History from 1492 to the present.

For a free ChallengeWare catalog contact Orbyte Software, P.O. Box 948, Waterbury, CT 06720 (phone: in CT 203-621-9361; rest of USA 1-800-253-2600).

Buy any two Springboard educational programs before February 15 and you'll get your choice of a third free from the manufacturer. Ask your dealer about the "1 + 1 = 3" promotion or contact Springboard Software, Inc., 7807 Creekridge Circle, Minneapolis, MN 55435 (phone: 612-944-3912).

Davidson & Associates have adapted *Spell It!* to the 64, containing 1000 commonly butchered words in four separate exercises. On disk; $49.95.

Davidson & Associates, 6069 Groveoak Place #12, Rancho Palos Verdes, CA 90274 (phone: 213-373-0971).

Five new C-64 programs from CBS Software, all on disk:

Weather Tamers ($39.95) lets players manipulate fronts, winds, temperature, and other meteorological elements to create weather appropriate for various North American regions.

Forecast! ($49.95) allows users to chart weather patterns, track hurricanes, and learn how atmospheric conditions combine to produce weather.

Pathwords ($34.95) requires one to four players to form words by linking letters on a 109-letter grid.

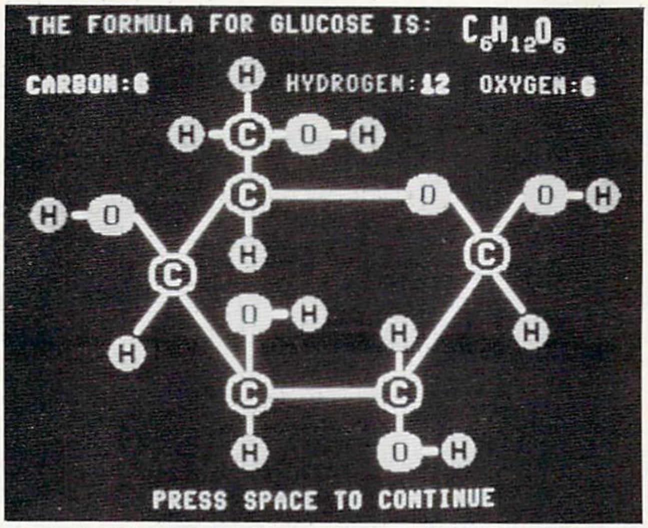
Big Bird's Funhouse ($34.95) lets one player aged three to six search for the hiding places of Big Bird and three other Muppets.

Astro-Grover ($34.95) requires a three to six year old child to answer arithmetic questions to help Grover build a city or launch a spaceship.

Tech-Sketch is giving away still more free light pens, with the first three releases in its new science education series. The pens will be included for a limited time with *Struc-*

ture of Leaves, Molecules and Atoms, or *Passive Transport,* all for the C-64.

Tech-Sketch, Inc., 26 Just Rd., Fairfield, NJ 07006 (phone: in NJ 201-227-7724; rest of USA 1-800-526-2514).



Tech-Sketch's **Molecules and Atoms** *for high schoolers.*
READER SERVICE NO. 179



THE DIE IS CAST

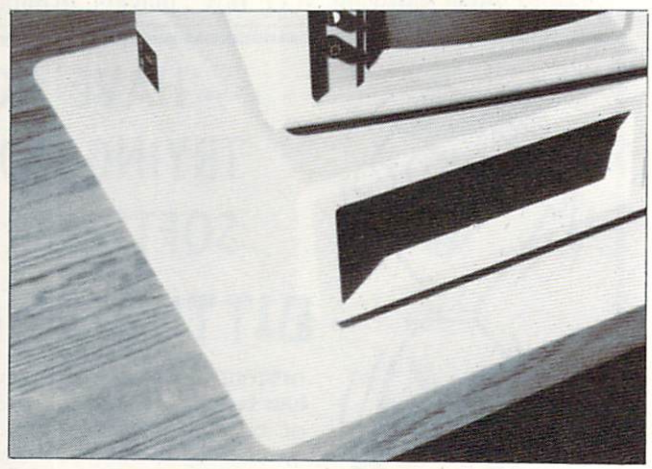
As if the software business wasn't enough of a crapshoot, Screenplay, Inc., has contracted with Caesars World Productions (owners of the famous casino hotels in Las Vegas and Atlantic City) to produce the *Caesar's Guide to Gaming* series for the Commodore 64.

The first scheduled release, *Blackjack* ($69.95), and subsequent releases like *Roulette, Craps,* and *Baccarat* will provide instructional drills that simulate actual casino play. Incorrect moves are stored in the computer memory for later redrilling.

Screenplay, Inc., 1095 Airport Rd., Minden, NV 89432 (phone: 800-334-5470).

STATIC PROTECTORS

You may have experienced some of the problems that can be caused by too much static electricity around your computer and peripherals: loss or alteration of memory, crashes, system failures, etc., etc. Advanced Marketing Concepts promises that their Static Buster, which attaches to your computer screen and keyboard or disk drive, will dissipate up to 20,000 volts in as little as 2 seconds, as well as prevent any backcharge of static electricity to the computer, monitor, or peripherals.



Charleswater's Electra computer pad dissipates static.
READER SERVICE NO. 180

Advanced Marketing Concepts, 19301 Ventura Blvd., Tarzana, CA 91356 (phone: 818-342-8877).

Another solution is Charleswater Products' Electra computer or keyboard pads of cushioned vinyl. Available in beige, blue, or brown, the 26 x 24" computer pad is priced at $50.00, the 22 x 11¼" keyboard pad at $25.00.

Charleswater Products, Inc., 93 Border Street, West Newton, MA 02165 (phone: 617-964-8370).

3M's First Touch desktop pad, measuring 9½ x 23½", is also designed to drain away static charge by means



Illustration: Stephen Jobe

Not just all talk.

Add Speech to your Commodore 64™ today!

With the POWER of **The Voice Messenger's™** infinite vocabulary, your Commodore 64 can say any letter, word or sentence. Simply!

Just for fun... or as an educational tool.

Best of all, it's simple to program your C-64 to leave all sorts of talking messages.

Just think of the possibilities!

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The Voice Messenger features: ▪ Infinite vocabulary ▪ One BASIC command "SAY" provides easy programming of whole sentences ▪ Two voices and intonation—add character and excitement ▪ Built-in software—nothing extra to buy ▪ Installs instantly—Two simple connections ▪ Clear, easy to understand speech ▪ Doesn't steal RAM from BASIC workspace ▪ Won't stop screen action.

Add new life to your Commodore 64 with The Voice Messenger! Ask for The Voice Messenger at your local Commodore dealer, or call TOLL-FREE 1-800-443-0100 ext. 797 to place your order now!

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For more information contact:

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Speaking For Consumer Electronics

50 Milk St. 15th floor, Boston, MA 02109 (617) 357-8084 TELEX: 951131 HQ BSN
Currah Computer Components Ltd. Reg. No. 1555490, U.K. Graythorp Industrial Estate, Hartlepool, Cleveland, U.K. Telex 58127 CURRAH G

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Reader Service No. 176

of its semi-conductive vinyl overlay and highly conductive "scrim" intermediate layer. Its price is $39.95.

3M, P.O. Box 33600, St. Paul, MN 55133 (phone: 612-733-1186).

NO REGARD

The *Swift* spreadsheet will permit entries in response to scripted text prompts without regard to placement of values in cells. Conditionals can be used to jump to specified cells or do alternate computations, and automatic saving, loading, and printing of the 6600 cells or ranges of cells is programmable. Price of the C-64 diskette is $29.95.

Audiogenic, Ltd., c/o Regenics, Inc., P.O. Box 767, Orange, CA 92666 (phone: 714-639-9396).

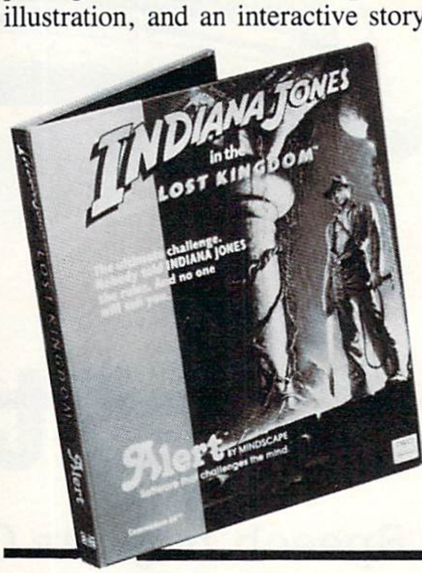
ALFRED PACKS 'EM IN

We thought the 15 utilities contained on Applied Technologies' *Bits and Pieces* disk (see December *Scuttlebutt*) was quite a bit for $29.95. Then we learned of Alfred's *Beginning BASIC on the Commodore 64.* Your $19.95 buys you a 198-page book of programming instructions and information, plus a disk of 33 programs (bearing such self-explanatory titles as *Quiz Maker, Music Writer, Database, Budget, Checkbook,* and *Bargraph*). Software purveyors across the country: can you top this?

Alfred, 15335 Morrison Street, P.O. Box 5964, Sherman Oaks, CA 91413 (phone: 818-995-8811).

FURTHER ADVENTURES

The shoot-'em-up is not dead, but more and more of them are withering on store shelves while players reach for adventure games, both graphic and non. Even Activision, masters of arcade-style action, have branched into production of "living novels," which they define as computer games with the text and plot of a novel, animated illustration, and an interactive story.



We don't know how all these kingdoms and civilizations keep getting misplaced, but to help Indy find this one will require resourcefulness and problem-solving abilities. *READER SERVICE NO. 202*

In *The Tracer Sanction* you dog the interplanetary criminal known as The Wing across a strange solar system, solving different puzzles on each planet you visit.

Mindshadow really stacks the deck against you, awakening you on a desert island, a victim of both shipwreck and amnesia. You must find your way back to civilization and discover your identity.

Both on disk for the C-64; $31.95 each.

Activision, Inc., 2350 Bayshore Frontage Road, Mountain View, CA 94043 (phone: 415-960-0410).

Another animated adventure, Mindscape's *Indiana Jones in the Lost Kingdom,* requires the player to find his way through six rooms, each with a puzzle to solve, en route to discovering the secret of a lost civilization. On disk for the 64; $29.95.

Mindscape Inc., 3444 Dundee Road, Northbrook, IL 60062 (phone: 312-480-7667).

Forget graphics. Forget music. The main thing computer games have over board games is that there are no dice to lose, or cards to get dog-eared. But Word Inc.

has incorporated both into *Narnia* and *Dawntreader*, based on C.S. Lewis' *Chronicles of Narnia* series. The arcade/adventure games utilize dice and cards "to add the elements of chance and surprise you don't find in other computer games." Silly us—we thought those elements could be programmed *into* games. A free book is included with each C-64 disk; retail price is $39.95.

Word Inc., Waco, TX 76703.

Up to the point where you catch a ride on a Vogon flagship moments before the destruction of the earth, Infocom's *The Hitchhiker's Guide to the Galaxy* mirrors the plot of Douglas Adams' delightful novel. From then on, you'll interact with the characters and locales of the book in a series of new adventures by Adams. On disk for the C-64, $34.95; for the Plus/4, $39.95.

Infocom, Inc., 55 Wheeler Street, Cambridge, MA 02138 (phone: 617-492-1031).

If you'd like to get on the bandwagon, Electronic Arts' *Adventure Construction Set* ($50.00) will let you create your own storylines, characters, settings, and sound effects without programming knowledge. While you can design any type of adventure you choose, fantasy, mystery, and science fiction formats are provided, each with appropriate graphics, objects, and terrain. The C-64 disk also includes *Land of Aventuria,* a tutorial comprising seven mini-adventures; and *Rivers of Light,* a complete adventure game set in ancient Egypt.

Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403 (phone: 415-571-7171).

PRINTOUT

At least until someone invents a computer cable that reaches into the bathroom, computer books will continue to thrive—as is evidenced by the following recent releases:

Commodore Logo: Activities for Exploring Turtle Graphics begins with easy hands-on activities and progresses to sophisticated graphic designs. $14.95 from Brady Communications Co., Inc., Bowie, MD 20715 (phone: 301-262-6300).

If you'd like to look into portable computers other than the SX-64 (reviewed this issue), *Thinking Small—The Buyer's Guide to Portable Computers* from Addison-Wesley covers over 40 from transportable (like the

Compaq) to briefcase (like the Apple IIc) to notebook (like the Epson HX-20). $12.95 (paperback).

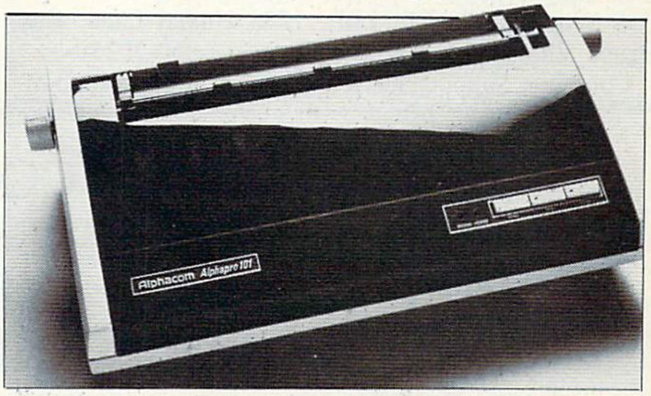
Also from Addison-Wesley, *The Cognitive Computer: On Language, Learning, and Artificial Intelligence* reports on the current status of AI and the computer's role in it. $17.95 (hardcover).

Addison-Wesley, Reading, MA 01867 (phone: 617-944-3700).

The Second Book of Machine Language uses fundamentals covered in its prequel, *Machine Language for Beginners*, to enable the reader to construct a major ML program. $14.95 from COMPUTE! Publications, P.O. Box 5406, Greensboro, NC 27408 (phone: 919-275-9809).

20 CPS DAISY WHEEL PRINTER

Packed into a compact 19 x 5½ x 11½" beneath a noise-reducing cover, the Alphapro 101 from Alphacom offers 20 character per second printing (with standard Diablo- and Qume-compatible daisy wheels and ribbon



Supports true proportional spacing, reverse linefeeds.
READER SERVICE NO. 203

cartridges), a 93-byte memory buffer (with 4000 bytes optional), and a one-year warranty. Operator controls include line feed, self-test, paper feed, and hammer intensity. Its $399.95 price includes a ribbon cartridge and a print wheel.

Alphacom, Inc., 2323 South Bascom Avenue, Campbell, CA 95008 (phone: 408-559-8000).

MUSICAL NOTE

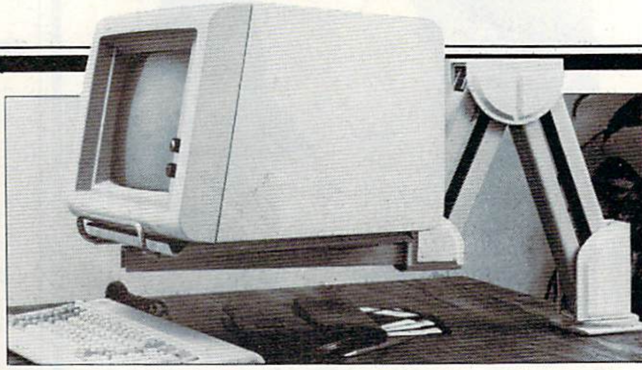
The selection of music keyboards for the C-64 swells once again with Music Port from Tech-Sketch. The 37-key, 3-octave, full-travel keyboard lets players double track music, create their own accompaniment, and store 10-minute songs on diskette. Cost is to the tune of $149.

Tech-Sketch, Inc., 26 Just Road, Fairfield, NJ 07006 (phone: in NJ 201-227-7724; rest of USA 1-800-526-2514).

ROOM ON THE TOP

You could meekly accept the corollary of Murphy's Law which states that the amount of clutter on a desk expands to fill the desk space available. Or you could get extra elbow room for your computer work station with any of the following products.

The CRT Valet is a steel arm that clamps onto your desk and holds your monitor above the desk's surface. Both arm and monitor platform rotate for viewing comfort. Cables may be routed inside the arm. $99.95 from MicroComputer Accessories, Inc., 5721 Buckingham Parkway, P.O. Box 3725, Culver City, CA 90231 (phone: in CA and HI 213-641-1800; rest of USA 1-800-521-8270).



Monitor cables may be routed through arm of CRT Valet.
READER SERVICE NO. 204

A Word of Plastic manufactures lucite Superstands that let you stack paper beneath your printer or store your 64 or VIC below your monitor. Superstand 1 ($46.00 clear, $55.00 smoked) measures 15½ x 6 x 11⅞"; Superstand 1HD ($90.00 clear, $120.00 smoked) is the same, but a heftier ⅜" thick.

A World of Plastic, Ltd., 2535 United Lane, Elk Grove Village, IL 60007 (phone: 312-860-2525).

Computer Support Services offers a monitor stand of inch-thick wood, with a rotating monitor platform ($39.00 plus COD postage charge). To order by mail, send check to Computer Support Services, P.O. Box 927, Santa Barbara, CA 93102.

Competition Pro, better-known for their line of quality arcade-style joysticks, markets a $29.95 plastic monitor stand that swivels 360 degrees and slants 12 degrees horizontally.

Competition Pro, 2609 Greenleaf Avenue, Elk Grove Village, IL 60007 (phone: 1-800-323-8174 or 312-228-1810).

Reader Service No. 132

GPC

GRAPHIC PRINTER CABLE

The Graphics Printer Cable (GPC) by Q-R&D is the truly universal graphic parallel printer interface for the Commodore 64™, SX-64™, and VIC-20™ computers.



GPC Features:

- ☐ For Virtually All Centronics-Parallel Dot Matrix Printers
- ☐ Direct and Complete Commodore™ Printer Emulation, Graphics, and Software Compatibility for most popular dot matrix printers including Epson™, Star Micronics™, Riteman™, Okidata™, Prowriter,™ Banana™, Seikosha™, and most similar printers.
- ☐ External Printer Selection Switches for easy access when choosing your printer type.
- ☐ Software Configurable – allowing Commodore™ printer emulation, graphics, and software compatibility for other new or non-standard type matrix printers.
- ☐ An Intelligent 2K Buffer Is Standard – which greatly increases printing speed for both graphics and text and allows you to use your computer sooner while printing.
- ☐ Command Channel With More Than 20 Commands – enabling you to control features like printer mode, graphic and control character listing method, text spacing, text width, pagination, character set, and interface reset without interfering with listings or software operation.
- ☐ Cardco™ Print Mode Compatible – The GPC is compatible with software written for use with printers using Cardco™ interfaces as well as Commodore™ printers, insuring maximum software compatibility.
- ☐ Complete Users Manual – including software examples and Hi-Res machine language screen dump.

QR&D

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Reader Service No. 207

HOW DO GAMES PLAY?

Continued from page 33

50 becomes 245, 51 becomes 246, and so on. And in line 1200, the beginning of the loop should be FOR I= 245 TO 252.

Of course, these changes only make space for the new rooms in the various arrays, and move the "you can't go that way" messages out of the way. To get to the new rooms, you have to add them to the Room Direction Table and the Room Name Table by adding new program lines after 1175 and changing some of the old direction table entries to get the player to the new rooms.

CHRIS CRAWFORD ON GAME DESIGN

Chris Crawford is the designer and programmer who created *Eastern Front: 1941*, *Legionnaire*, and *Excalibur*, among others. Crawford began his game creations back when Atari was the only powerful and easily programmable home computer with good television color handling—i.e., before the VIC and Commodore 64. So his game designs have been primarily for the Atari. Even though specific games are tied to specific computers, the principles of computer game design transcend hardware barriers, and his book is valuable for any amateur or novice game designer.

His book is strongest when he talks about the actual process of designing a game—both the general principles and the specific example of how he developed *Excalibur*. He won't tell you anything about specific programming techniques, like how to do page-flipping or how to handle joystick input. He'll tell you something much more important: how to decide *when* to use page-flipping and *when* to use a joystick.

PROCRUSTEAN PROGRAMMING

You remember the Greek legend of Procrustes, the charming host who would put his guests on his cleverly designed bed; if the guest was too short for the bed, Procrustes would stretch him to fit, and if the guest was too long, Procrustes would cut off the excess.

No doubt if he had lived nowadays he would have opened a motel which advertised "our beds are an exact fit for everybody"—but public relations in those days weren't so good, and now the "bed of Procrustes" is remembered as the first time somebody tried to force software to fit into hardware it just wasn't designed for. After a lot of blood, sweat, and tears, it might fit—but nobody's very happy about it.

Crawford has little patience with game designers who try to bend the computer to fit their preconceived game ideas. Like any artist, he expects the game designer to understand his or her medium and work around its limitations while emphasizing its strengths.

For instance, non-computer war simulation games often use gameboards divided into hexagonal spaces, which allow fairly equal movement in all directions. But the computer, tied as it is to the raster-scan television screen, doesn't do hexagons very well. It doesn't even do *squares*—the basic shape on the computer's screen is the vertical rectangle. Now, with elaborate programming you can indeed draw little hexagons on the screen. But why bother? Instead, use the basic shapes of the computer. Don't try to turn the computer into something it isn't.

But the computer has strengths, as well as limitations, and you should know those well enough to use them. For instance, the size of the game board is often a problem with non-computer board games. A mammoth board just gets in the way after a while. But the computer can maintain huge playing fields, much larger than you could possibly have in a board game.

Larger? How? The TV screen is *smaller* than the average game board. Ah, but the computer can quickly move from one screen to another with page-flipping. Let's take the game *Clue*, a mystery-solving puzzle game that requires the player to move from room to room, checking for clues and asking questions. As I recall, there are nine or ten rooms on the *Clue* game board. I remember that as little kids playing *Clue*, my siblings and I often wished we could go visit rooms that weren't on the board—the attic, for instance, or the basement, or the bathroom.

A computer version of this gameboard could not effectively show ten shows. A single screen could probably show only four or five. However, you could easily have ten or twelve screens in memory, each with four rooms or so. Then, when the player moved off the edge of the screen, the program would "flip" to another page of screen memory and show the screenful of rooms that adjoined the previous screen. If the player's figure touched a stairway, the program could "flip" upstairs or downstairs. And if the mansion really needs to be large, more rooms could be stored on disk, to be brought into memory when they're needed.

Duplicating the *Clue* gameboard on the screen would be foolish—each room would be so small it would be almost invisible. But adapting the basic idea—a mansion with many different rooms—and using the features of the computer, we can make a house that "flows," so that movement is much freer and passes through a much larger area than could ever be made to fit on a flat gameboard on your dining room table.

Furthermore, since the computer is smarter and more versatile than the cardboard playing field of *Clue*, you can program it to do tricks. *Clue* has two "secret" passages connecting the opposite corners of the board. However, they aren't much of a secret, since they are plainly visible to all the players. But the computer can maintain secret passages that really are secret—you can't find it until you touch a particular spot on the wall, for instance, or until you touch two items of furniture in the right order. Then you suddenly find an open door, or fall through a trap into another room.

And the computer doesn't have to use the same secret passage all the time. You could program such a mansion with a hundred possible secret passages; each time a game was started, the program would randomly select three or four of those passages to be active.


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(In fact, this sounds like so much fun I think I'll devote next month's article to creating that mansion, with secret passages and page-flipping to move around.)

So the computer's limitation–a screen too small to show a full-size game board–is easily matched by its strength–memory enough and an operating system versatile enough to allow instant movement from one part of the house to another.

Besides page-flipping, there's another option. The wonderful game *Murder on the Zinderneuf* from Electronic Arts is essentially a souped-up *Clue* game. You are a detective going from room to room on a luxury zeppelin, desperately trying to solve the crime before the flight of the Zinderneuf ends. Instead of flipping from room to room, however, *Murder on the Zinderneuf* scrolls vertically through the zeppelin. This is a technique that absolutely requires machine language on the Commodore 64, and so we probably won't ever deal with it in these articles; but if you are mastering 6510 machine language and vertical-blank interrupts you'll find that smooth and gradual movement through vast areas of memory is relatively easy to do.

ON TO THE QUIBBLES

Crawford's perceptive look at the limitations and possibilities of computer game design is worth the price of the book–but other parts of the book range from debatable to silly. Which is a comfort–if Crawford were *perfect,* the rest of us could hang up our hats and leave computer game design to him. In fact, he gives the distinct impression that in his opinion most game designers *should* hang up their hats. But far too often, what Crawford calls "bad design" is really just "games Chris Crawford isn't interested in."

For instance, Crawford has no patience at all with sports simulation games. "They are anachronisms from the early days of computer game design when computer games had no separate identity. Lacking original ideas, designers turned to sports for models." This is, if you think about it a moment, just about the silliest thing Crawford could have said.

After all, his most famous and popular games are simulations, not of sports, but of war. One could as easily say, "Chris Crawford, lacking original ideas, turned to war for models." How is it "superior" to create a program that allows a player to be the general of the German forces on the eastern front in 1941, carefully simulating the attack and defense of a vast battlefield, and "inferior" to create a program that allows a player to be the coach of the Washington Redskins playing the Dallas Cowboys, carefully simulating the offense and defense of a hundred-yard football field?

Crawford, a long-time non-computer wargamer, simply likes wargames better than sports. Nothing wrong with that. But his almost angry comments in several places in the book about how stupid it is to simulate sports on the computer made *me* see red. I'm one of those people who has never had any athletic ability–but I enjoy very much playing football or basketball on the computer. The *Track-and-Field* videogame that came out in time for last summer's Olympics had me enthralled, until I was able to set the broad-jump and javelin records on the machine in our local arcade.

Some sports simulation games, like *Track-and-Field,* allow you to duplicate some of the aspects of athletic performance, like timing and quickness, while the computer takes care of other things, like brute strength and body weight. Other sports simulation games do what war simulation games do–allow you to develop strategy, to outthink the other guy (or the computer). Crawford's biases aside, he shows no reason whatsoever for distinguishing between war simulations and sports simulations –and once the baselessness of his bias is clear, it calls a lot of his other philosophical statements into question.

DEFINING A GAME

For instance, Crawford devotes a good deal of his time to telling us what a game is *not.* "We must be careful to distinguish between athletic games and athletic competitions. For example, a race is a competition.... I distinguish between [games and competitions] by the degree of interaction among players." To him, a race is merely a competition, because you could run your race alone, with a stopwatch, and it wouldn't make much difference (except for the psychological effect of having the other guy pounding away a few steps ahead of you, or a few steps behind). Wrestling, on the other hand, is a game, because it simply cannot be done without two opponents.

But here he's playing semantic games that are almost meaningless. We don't use the words *game* and *competition* that way. Races and matches have always been part of the Olympic Games. We consider golf to be a game, and yet the other player's performance is almost irrelevant to your own. At the same time, wrestling is certainly a competition.

The real problem is not that Crawford has not noticed an important distinction, it is that he has insisted that one is a game and the other is not. This is as silly as when a pedantic snob insists that one style of painting is not "art." Of course it's art. Maybe not *good* art, maybe not art that you *like,* but still art, nonetheless.

Likewise, wrestling and racing are both games, and the computer versions of both are also games. However, wrestling is a highly interactive game, and racing is not.

What Crawford fails to see is that few computer games are truly interactive between *human* opponents, but *all* computer games are highly interactive between the human player and the computer game designer.

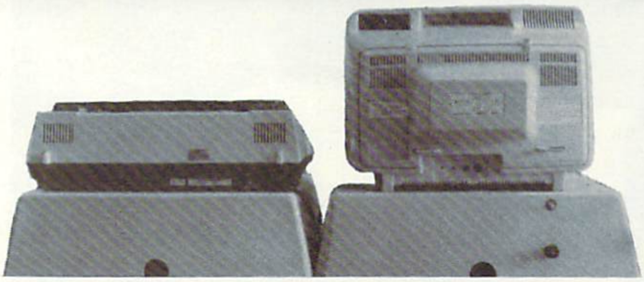
DESIGNER AND PLAYER

It's like golf. Whether you do your eighteen holes alone or with a foursome that kibitzes and cheats, your game is not affected in the slightest. But it makes a huge difference whether you play at Pebble Beach or your local neighborhood miniature golf course. It is not the other players that you interact with, it is the course itself–the slopes, the roughs, the traps, the distances. And be-

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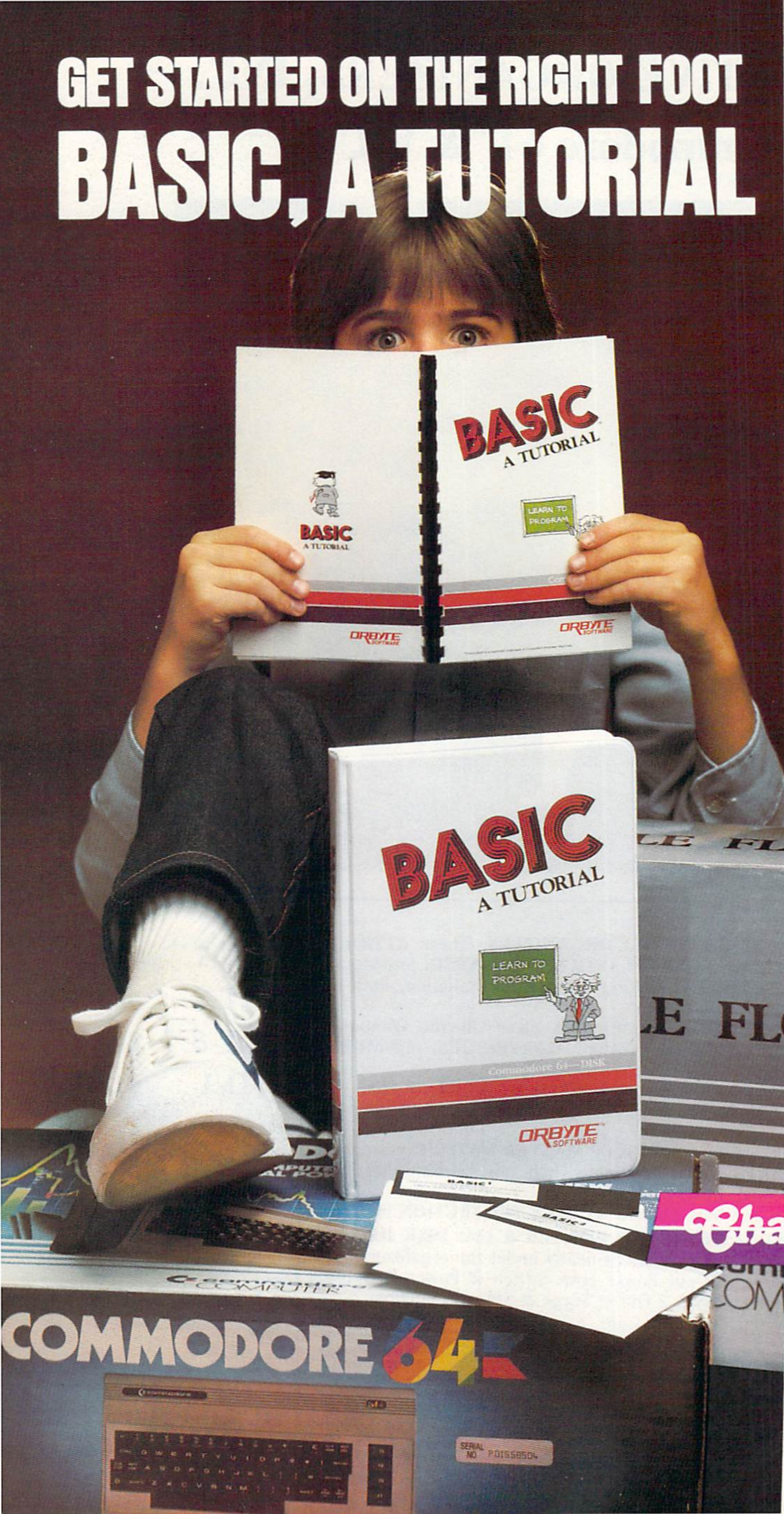
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hind the course is the human designer. The course designer created a single course, but one which changes with the weather, the seasons, and the player's own ability, so it never plays the same way twice.

The computer gamewright is much like the golf course designer. When you design a game, you are creating a milieu, a world, like the golf course designer does. The player and the designer are interacting to create the game.

Crawford's distinction between games and competitions is meaningless. However, it is not meaningless to say that the more interactive a computer game is, the more likely it is to stay interesting. That is, the more the player himself can change the milieu of the game, the more fun it is to play.

Take *Space Invaders*. About the only thing you can do is move your guy back and forth, shoot up the bad guys, and hide behind barriers. You can create tiny "windows" in the barriers to shoot through, if you like. And that's about it.

But in a game like *Dig-Dug*, every move you make digs a path, which the enemy creatures usually travel through. You are, in essence, creating the game board as you play, and the game requires you to develop complex geometries in several dimensions in order to win. *Dig-Dug*, then, has a high degree of interaction between the player and the game designer, while *Space Invaders* has almost none.

Yet *Space Invaders* is no less a true game than *Dig-Dug*, and *Dig-Dug* is no less a game than *Eastern Front: 1941*, with its excellent artificial intelligence routines and even higher degree of interaction between player and designer. It is snobbish to say otherwise.

Having said that, though, let me affirm again that if anyone has earned the right to be a snob about computer games, it's Chris Crawford. There's no law that says that just because you know how to make great games, you must also know how to explain what makes games great. In fact, even Crawford's biases are worth reading, as long as you don't *believe* them, for they are a clear demonstration of why gamewrights are artists, not just programmers.

For Crawford's brilliant games are as much a product of his biases as of his understanding. Certain types of things *feel* right to him in games, while other things don't. When something doesn't feel right, he knows it doesn't belong in his game, and no matter what reason he assigns to that feeling, he is absolutely correct to obey it. Chris Crawford's artistic sensibility tells him to reject sports simulations and to strive for ever higher degrees of interaction. Great! I'll go to somebody else when I want to buy a sports game, and when I want a wonderful, highly interactive, brilliantly programmed wargame Chris Crawford will get my money.

And when I want a valuable and fascinating book on computer game design, he'll get my money again. Not because his book will teach me all there is to know about game design, and not because everything in his book is true. But rather because his book will tell me the story of how he designs games, and from his experience I can learn more about how *I* design games.

When it comes down to it, though, game design, unlike game programming, can't be *taught*. In my articles in *Ahoy!*, I can teach you techniques that you might need in order to program games, and I can give you some ideas about game design, but in the end, the difference between brilliant gamewrights and schlockmeisters is their own sense of what is and is not good and right in the game. That can't be taught. It can only be discovered by the gamewright as he or she practices the art.

DIVIDING GAMES INTO GROUPS

For that reason I freely forgive Crawford for spending many pages on a worse-than-useless "taxonomy" of games, dividing games into genera and species as if they were natural objects. His divisions are not clear-cut, like the standard used for differentiating species of living things—if they can't mate and produce fertile offspring, they're different species. Instead, he divides games the way that Aristotle divided animals—according to some superficial differences in function. There are walking animals, flying animals, and swimming animals. Don't ask what bats, penguins, seals, and beavers are.

How else can we make any use of a taxonomy that distinguishes between "combat games" and "paddle games." Can't you conceive of a combat game played with a paddle? I can. Can't you conceive of a combat game that is also a maze game? We who have played *Tron* know that it can be done.

The problem is not just that Crawford's distinctions aren't good—it's that games can't be divided into distinct classes at all, and attempting to do so is a marketing strategy, not a critical strategy. The guys who sell you disks in cellophane wrappers, so you can't possibly tell what the game is, use marketing terms like "text adventure," "graphic adventure," "maze game," etc., so you have some idea of what you're spending forty bucks to buy.

But text adventures usually include mazes; combat is at the heart of many *Dungeons and Dragons*-type games; paddles and joysticks are just two types of controllers which can be used in any type of game; and fast-action games often require as much strategy as tactics.

Instead of dividing games into neat little compartments, which shouldn't and can't honestly be done, it is much more useful to isolate different problems or traits of games. A game can be highly interactive or only slightly so; a game can be either highly visual or less so; it can be representational or abstract; it can emphasize puzzle-solving; it can require quick reflexes. Any game can partake of each possible trait to a greater or lesser degree, just as novels can be descriptive, full of action, puzzling, written in beautiful language, or sexy—all at once, or one at a time. What matters is not finding labels for types or classes of games, but rather finding different aspects of how games work, and seeing how different games emphasize or ignore those aspects.

Now we're standing on the edge of philosophy of criticism, and that isn't what you signed up for when you

began reading this article. I think it's important, though, to remember that you don't have to limit yourself to thinking, "I'm going to do a maze game" or "I'm going to do a strategy game," as if you couldn't do a strategy game set in a maze, or couldn't design a fast-action maze game that required strategic thought.

Far better is to do what Crawford himself actually does. Forget the classifications. Think of what fascinates you, what you would love to play if only someone would create it—and then start figuring out how to bring it to life on the computer's screen. Let pin-headed critics like me come along later and argue about whether you created a type-A game or a type-B game. As long as it's *your* type of game, chances are that if your programming is good and the game actually does what you wanted it to do, other people will like it, too. Then the critics can say what they want, and it makes no difference at all.

NEXT TIME

As I mentioned above, next time we'll create an elaborate mansion that we can move around in, complete with secret passages that change each time we play. As usual, it won't be a complete game, but rather a starting point for your own games.

And if you have questions or suggestions or viciously scathing remarks, please send them in to *Ahoy!*, and we will not only answer them as quickly as possible, we will also hold you up to public ridicule in the process. After all, if it works for David Letterman, why shouldn't it work for us? ☐

TELELINK 64

Continued from page 17

or destroyed).

Choices 1 and 2 turn the buffer ON and OFF, respectively. These functions apply only to the terminal mode, for there is no need to turn the buffer on when loading text files.

Choice 3 returns you to the main menu.

OVERLAY

The *Telelink Overlay* program that follows the listing for *Telelink* (see page 70) will produce an overlay for use with the program. It should be typed into your 64 and SAVEd using the filename "TELINK OVERLA". When RUN, the program will print an overlay to be cut out and placed over the function keys. It will show you, at a glance, what each function key does while in the terminal mode or the search text mode. For the benefit of those who don't have a printer, a version of the overlay appears on this page. Just photocopy it and cut it out.

Watch for additions to *Telelink 64* in future issues of *Ahoy!* If you have any suggestions for additions you would like to see or any type of program at all, write to me care of *Ahoy!* I will respond where appropriate. Happy telecommunicating! ☐

SEE PROGRAM LISTINGS ON PAGE 69

COMMODARES

By Dale Rupert

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. Send your solutions to:

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We will print and discuss the cleverest, simplest, shortest, most interesting, and/or most unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Also show sample runs if possible, where appropriate. Programs on diskettes are welcome, but they must be accompanied by listings. Also tell what makes your solutions unique or interesting, if they are. You must enclose a stamped, self-addressed envelope if you want any of your materials returned.

Your original programming problems, suggestions, and ideas are equally welcome! The best ones will become *Commodares*.

PROBLEM #14-1: MAXIMUS INPUT

This problem was submitted by Hugh Rountree (Perry, FL). Your task is to write an input routine which allows the user to type up to 255 characters before pressing the RETURN key. The characters are stored in a single string variable. All keyboard characters are allowed, including commas, quotes, etc. Only the RETURN key and the DELETE key are functional. All others are stored in the string variable. One more catch: the routine must display a cursor. That should hold you for awhile. Hugh's solution will be listed next month.

PROBLEM #14-2: SINGLES ONLY

Most of you are familiar with the sentence "The quick brown fox jumps over the lazy dog" which is used to verify that all keys on a typewriter work. This problem is to write a program to evaluate other such sentences. Specifically, the user types a sentence. The computer outputs a list of which letters of the alphabet are missing from the sentence. As an added feature, the program lists all letters which are duplicated within the sentence. A "perfect" typewriter tester would contain a single occurrence of each and every letter. If you find any such sentences, send them along with your solution.

PROBLEM #14-3: DIGITAL DEDUCTION

This problem was sent by Patrick Bergin (District Heights, MD). Write a program in which the computer guesses your secret number between 1 and 1000 in 10 guesses or less. You provide only the clues "too high" or "too low" in response. (Can your program guarantee fewer than 10 guesses by the computer?)

PROBLEM #14-4: ROMAN TRANSLATION

James Killman (Memphis, TN) suggested doing the opposite of *Commodare #10-2: Roman Numerals.* So here it is. Write a program which accepts any Roman numeral between 1 and MMMCMXCIX (3999) and prints out the proper Arabic value. Don't make it fancy but make it neat!

This month we will look at reader's solutions to October *Commodares*, among other things. In response to *Problem #9-2: Never Ending*, Jim Speers (Niles, MI) defined this interesting function:

```
DEF FNC(X) = X - (X < 7) + 6*(X = 7)
```

In the middle of a FOR-NEXT loop, Jim used statements similar to these:

```
POKE 646,C : C = FNC(C) : PRINT C
```

The value of C was initially set to 1. Can you figure out the purpose of this function and these statements? Get out the paper and pencil to calculate values of the function before you type it into your computer. We might call this a cycling function.

Problem #10-1: Numeric Palindrome was certainly a computational challenge. No one sent the palindrome for the number 196. This is not surprising since even the big machines have supposedly not been able to find the solution (let us know if you have such a solution!). By far the most concise program was submitted by Barbara Steinman (New York, NY). Her solution, even further simplified, is listed here:

```
1 REM PROBLEM #10-1: NUMERIC PALINDROME
2 REM SOLUTION BY BARBARA STEINMAN
10 INPUT"ENTER A NUMBER";X$:L=LEN(X$)
20 PRINT C"STEPS":Y$="":GOSUB100:IFX$=Y$
THEN PRINT X$:END
30 IF L>8 THEN PRINT "TOO LARGE":END
40 T=VAL(X$)+VAL(Y$):X$=MID$(STR$(T),2):
L=LEN(X$):Y$="":GOSUB100:C=C+1:GOTO20
100 FORJ=LTO1STEP-1: Y$=Y$+MID$(X$,J,1):
NEXT:RETURN
```

Michael Hooper (Tyler, TX) and David DeSha (Chat-

tanooga, TN) sent solutions which provided step by step outputs so that the user could see the progress of the computer as it worked. All three programs were limited to working with numbers up to nine digits long.

Jeff Stremming (Teutopolis, IL) went a step further and created his own addition routines so that his program could work with numbers up to 255 digits long. He found the palindrome for 187 to be 8813200023188 in 23 passes and 11.33 seconds. The essence of his program is listed below. Can anyone expand it to be able to handle even longer numbers?

```
1 REM PROBLEM #10-1: NUMERIC PALINDROME
2 REM SOLUTION BY JEFF STREMMING
120 INPUT"ENTER A NUMBER";N
130 IF N>999999999 OR N<5 THEN 120
140 PRINT"SCREEN OR PRINTER (S/P)";
150 GETR$:IFR$=""THEN150
160 IFR$="S"THENE=2:OPENE,3:GOTO190
170 IFR$="P"THENE=3:OPENE,4:GOTO190
180 GOTO150
190 PRINT#E:PRINT#E,"NUMBER =";N
200 C=0:T0=TI
210 A$=STR$(N):L1=LEN(A$):A$=RIGHT$(A$,L
1-1)
220 L1=LEN(A$):B$=""
230 FORL=L1TO1STEP-1:B$=B$+MID$(A$,L,1):
NEXT
240 IFC=0THEN260
250 IFA$=B$THEN350
260 F=0:F$=""
270 FORL=L1TO1STEP-1
280 A=VAL(MID$(A$,L,1)):B=VAL(MID$(B$,L,
1))
290 D=A+B+F:IFD>9THENF=1:GOTO310
300 F=0
310 D$=STR$(D):D$=RIGHT$(D$,1):F$=D$+F$:
NEXT
320 IFLEN(F$)>254ANDDF=1THEN380
330 IFF=1THENF$="1"+F$
340 C=C+1:A$=F$:GOTO220
350 PRINT#E,"THE PALINDROME IS ";A$
360 PRINT#E,"NUMBER OF PASSES =";C
370 PRINT#E,(TI-T0)/60"SECONDS":PRINT#E:
CLOSEE:END
380 PRINT#E,"OVERFLOW AT ";C;" PASSES"
390 GOTO370
```

David DeSha noted that all palindromes greater than 10 were multiples of 11. Are any of you math buffs able to prove or disprove this conjecture?

The biggest response this month was for *Problem #10-2: Roman Numerals.* Programs ranged from elegant to sublime (and from 5 lines to 70 lines in length). The two most concise solutions were sent by David Alan Wright (New Britain, CT) and by the Clifton Park, NY VIC 20 and C-64 Users Group. Their solutions are listed below. Notice the two completely different approaches.

```
1 REM PROBLEM #10-2: ROMAN NUMERALS
2 REM SOLUTION BY CLIFTON PARK VIC20 AND
 C64 USERS GROUP
10 DIM R$(13),V(13):FORI=1TO13:READR$(I)
,V(I):NEXT
20 DATA M,1000, CM,900, D,500, CD,400,
C,100, XC,90, L,50, XL,40
30 DATA X,10, IX,9, V,5, IV,4, I,1
40 INPUT"NUMBER";D: I=1
50 IF D>=V(I) THEN PRINT R$(I);:D=D-V(I)
:GOTO50
60 I=I+1: IF I>13 THEN PRINT: END
70 GOTO 50
```

```
1 REM PROBLEM #10-2: ROMAN NUMERALS
2 REM SOLUTION BY DAVID ALAN WRIGHT
10 PRINT" ENTER A NUMBER ( <4000 ) TO CO
NVERT TO ROMAN NUMERALS"
20 N$="IVXLCDM":FORI=1TO9:READP$(I):NEXT
:INPUTD$:D$=LEFT$("0000",4-LEN(D$))+D$
30 D=VAL(D$)+.5:FORI=1TO4:R=INT(D/(10^(4
-I))):IFR=0 THEN 50
40 FORJ=1TOLEN(P$(R)):PRINTMID$(MID$(N$,
9-(2*I),3),VAL(MID$(P$(R),J,1)),1);:NEXT
50 D=D-R*10^(4-I):NEXT:DATA 1,11,111,12,
2,21,211,2111,13
```

James R. Pring (Rantoul, IL) and James E. Killman (Memphis, TN) both had solutions which could properly handle Roman numerals greater than 3999. A bar over a numeral represents 1000 times the normal value of the numeral. Thus the number 3,999,999 is the largest value representable. Its equivalent would be MMMCMXCIXCMXCIX. Do you suppose the Romans used such large numbers?

Other solutions of merit were received from Donald Stovicek (Willowick, OH), Paul Lalli (McAlester, OK), Paul Hawthorne (Wilburton, OK), Dick Eigenraam (Oak Harbor, WA), Roger Morissette (Repentigny, QUE), Larry Cox (Petersburg, MI), Bob Foley (Umatilla, FL), Don Kolb (Tulsa, OK), and Barbara Steinman (New York, NY). Hopefully we'll see solutions to this month's Roman numeral problem from all these readers and others too.

There were three variations on the theme of *Problem #10-3: Up/Down Timers.* A few solutions used FOR-NEXT loop pauses of calibrated lengths to create the timing function. Most programs, however, used the internal clock. The two methods for doing this involved statements like these:

```
ET=INT(TI/60) : PRINT TT-ET,ET
```

and

```
ET=VAL(RIGHT$(TI$,2)) : PRINT TT-ET,ET
```

where ET is the elapsed time, and TT is the user-input total time.

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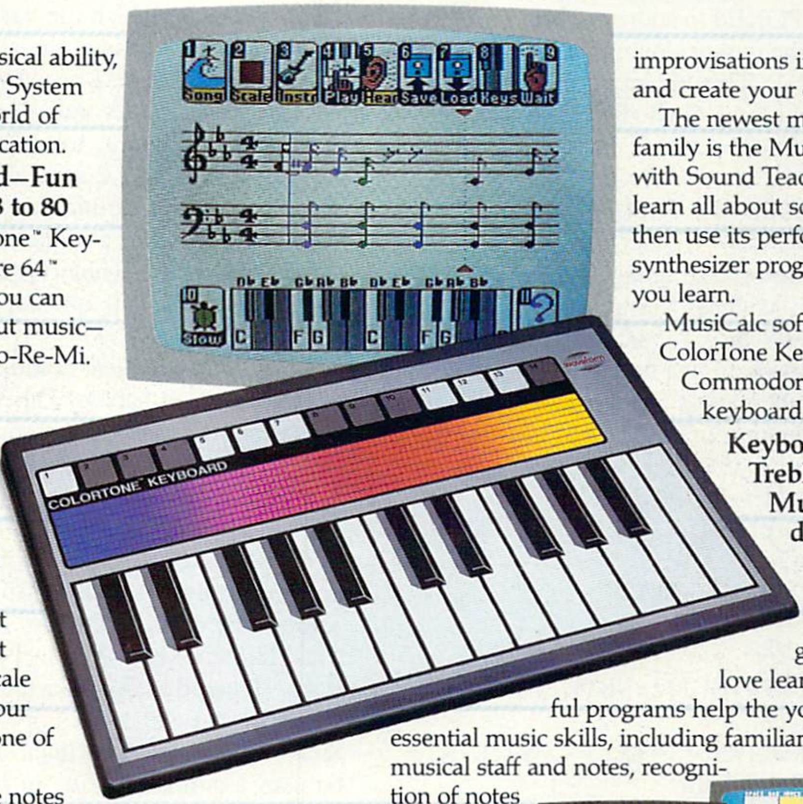
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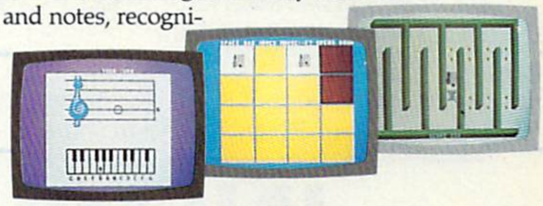
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The bulk of most programs consisted of numerous cursor movement characters to put the digits in the middle of the screen, as specified. It is tidier and easier to use the following statements to position the cursor at row R and column C on the screen before printing:

```
POKE 214, R-1 : PRINT : POKE 211, C
```

The value of R ranges from 1 to 24, and the value of C must be between 0 and 39 inclusive. To position the cursor in row 0, at the top of the screen, set R to 256 (so that 255 is POKEd to address 214). The PRINT statements moves the cursor down one row. That's the reason for using R-1. Thus to move the cursor to the center of the screen on the C-64 (ROW 13, COLUMN 20), try:

```
POKE 214, 12 : PRINT : POKE 211, 20
```

The fastest shuffle routine along with an interesting analysis came from Michael Mastroianni (Olcott, NY) in response to *Commodares #10-4: Fast Shuffle*. His solution shuffled the deck in just under 1.04 seconds. He investigated such subtleties as changing the order of operations in the evaluation of R in the following listing:

```
2 REM PROBLEM #10-4: FAST SHUFFLE
3 REM SOLUTION BY MICHAEL MASTROIANNI
10 DIMC(52):X=52
20 FORJ=1TOX:C(J)=J:NEXT
30 T=TI:GOSUB80
40 PRINT(TI-T)/60
50 FORJ=1TOX:PRINTC(J);:NEXT
60 END
80 FORN=1TOX:R=1+RND(.)*X:J=C(N):C(N)=C(
R):C(R)=J:NEXT:RETURN
```

Surprisingly, using X * RND(.) is more time-consuming than using RND(.) * X. If you can explain that, please do. That intrigued me to try some other tricks to speed things up. BASIC handles variables faster than it handles numeric constants. Some versions of BASIC look sequentially through all defined variables to locate the value of the one it needs. The variables defined earliest in the program are the quickest ones to find. Therefore I added the following line to the program above:

```
1 N=1 : A=1 : R=1 : J=1
```

and I replaced the 1's in line 80 with A. By simply changing the order in which the variables are defined in line 1, I was able to change the shuffle time by more than 7 percent. With line 1 as shown above, the subroutine takes a mere 0.967 seconds. (Apparently the DOS Wedge is a significant factor, too. Once the Wedge is loaded, my best time was 1.2 seconds!) If you enjoy this type of activity, try some investigations on your own. Perhaps there is a better sequence for line 1. Maybe you can speed up the calculation of R also. Using the "." with the RND function is quicker than using a constant or a variable.

Several readers sent solutions of a similar nature to the program listed above. Other solutions used two arrays for the shuffle, and they were significantly slower. Arrays are useful, but it takes BASIC longer to deal with them than with simple numeric variables.

The following readers also submitted correct solutions to *Problem #10-3* and/or *Problem #10-4:* Aaron Hughart (Pocatello, ID), Bob Spirko (Calgary, Alberta), Vaughn Brigham (Cadillac, MI), Patrick Bergin (District Heights, MD), Michael Hopper (Tyler, TX), Bob Foley (Umatilla, FL), Martin Levinton (New Rochelle, NY), Steve Feld (New York, NY), and J.R. White of Snake River Software (Idaho Falls, ID) who mentioned he uses a similar routine in his product *Silicon Slick's Lowball Draw Poker.*

Have fun with this month's challenges. Keep those ideas and solutions coming. See you next month. ☐

INSURANCE AGENT
for the C-64

By Glenn Lumpkins

I use my Commodore 64 at home to make life easier, simplify my filing cabinet, and obtain information fast. *Insurance Agent* will do all three.

The program will determine the amount of insurance you will need to cover funeral costs, estate taxes, non-mortgage debts, college tuition, living expenses, and other monetary needs. Taken into account are spouse's income, social security benefits, and present and future investment income from either an aggressive investment (4% real growth) or a conservative investment (2% real growth). After input at the prompts from the screen the computer will list the various expenses and income, and will indicate the amount of life insurance required to maintain the family's style of living.

I am presently working on a personal financial program which will interface with the life insurance program to further aid an individual in establishing his net worth and future monetary needs.

Some of the program's mathematics are derived from statistics provided in "Changing Life Insurance Needs Require Periodic Look at Your Family's Coverage" by Karen Slater, published in *The Wall Street Journal.* ☐

SEE PROGRAM LISTING ON PAGE 73

All the programs in this issue of *Ahoy!* are available on disk or cassette. See page 80 for details.

Getting the Words Across: Printer Interfaces for the Commodore Computers

By Morton Kevelson

Readers of this magazine could hardly have missed the fact that Commodore is now the acknowledged leader in the home computer market. This position has been achieved by the consistent offering of low cost, high performance computers to the end user, a trend started by the VIC 20 and maintained by the still popular C-64. We have every reason to believe that Commodore will maintain its leading position, particularly in view of the introduction of the Commodore 16 and the Plus/4.

Most users soon find out that their computer's applications are directly related to the support peripherals available, particularly the video display unit (TV or monitor), closely followed by a mass storage device (cassette or disk drive) and a hard copy transducer, or printer. Commodore, in recognition of this need, offers a line of compatible hardware. For printers, there's a choice of two: the MPS-801 and the 1526. Each offers an excellent price-to-performance ratio. Nonetheless, some users, willing to pay a small premium for increased printer performance, look elsewhere. The Commodore printers lack the speed and many of the features of some other manufacturers' models. Some users have perfectly functional printers which were used with other systems. Others may still be laboring under the delusion of someday switching to a different brand of computer. Thus a "standard" printer may be usable with other brands as well.

Whatever the reason, the peripheral in a Commodore user's system most likely not to be made by Commodore is the printer. In response to this demand, several independent manufacturers are producing interfaces which permit the use of non-Commodore printers with the Commodore computers. The number of firms involved has increased dramatically, as has the number of Commodore users, since we looked at this genre just one year ago (see the March and April 1984 issues of *Ahoy!*). At that time we had found only two products which offered some degree of graphic compatibility. At the time of this writing, we can report on five which provide total emulation.

INTERFACE REQUIREMENTS

A non-Commodore printer cannot simply be plugged into your Commodore computer. Significant hardware and software incompatibilities must first be overcome.

To insure maximum compatibility with existing software, the preferred port of entry is the serial port. However, this six-pin DIN connector which services the Commodore disk drive as well as the printer is mechanically and electrically incompatible with both the Centronics parallel and RS-232 serial interfaces used by most printers.

Software problems exist as well. The character codes used by most printers adhere to the ASCII standard. The Commodore character codes do not. To further complicate matters, Commodore computers have two complete character sets with a collection of unique graphics symbols. If nothing else, ASCII printers cannot reproduce these Commodore graphics characters without some outside help.

The emphasis of this report is on interfaces which can provide total emulation of the Commodore 1525 printer when used with a suitable dot matrix printer. Although the 1525 has been superseded by the MPS-801, they are for all practical purposes software-identical. In addition, all software we have seen to date supports the 1525 as a minimum requirement.

The December *Ahoy!* included a mini-tutorial on the use of the 1525. Ideally, the printer and interface combination should behave exactly as the 1525. Of course, this means that the particular features of the non-Commodore printer will not be accessible. Thus the interface should also provide some means of letting the user access these features. As we shall see, all the interfaces will allow you to exercise your printer to your heart's content. Some of them go so far as to add to the printer's built-in capabilities.

In particular, we looked for the following features while working with these interfaces:

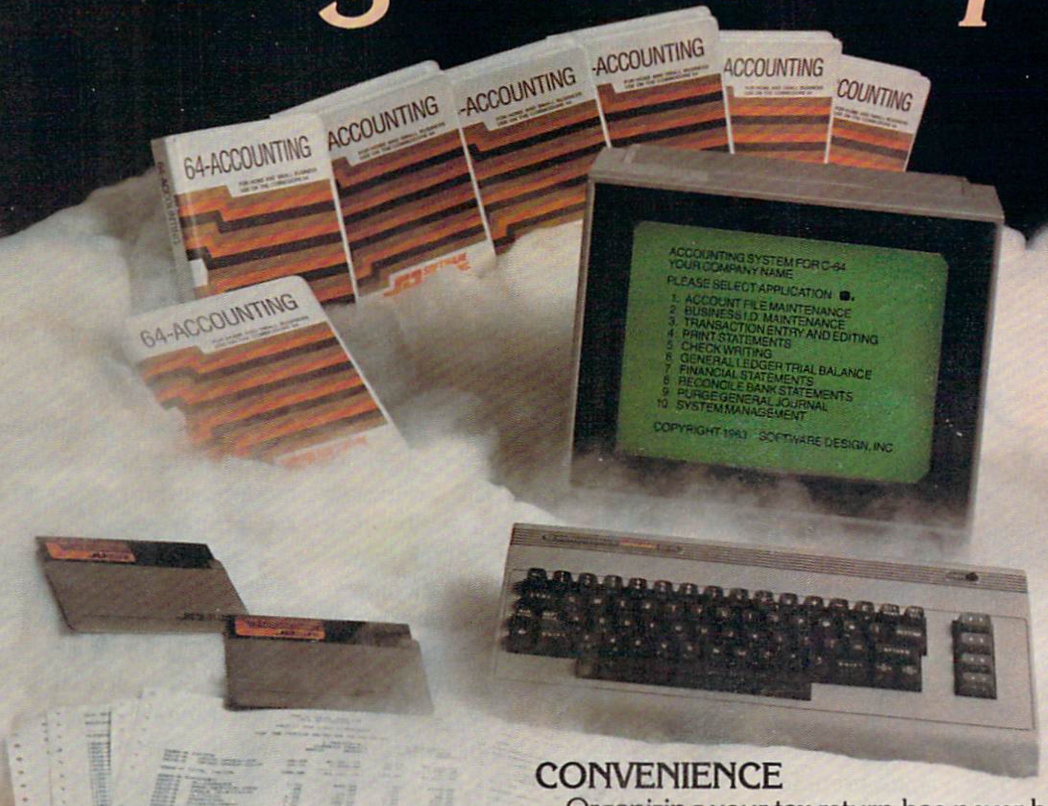
1. Hardware compatibility—all the interfaces properly matched up the Commodore serial port with the popular Centronics parallel printer port. One interface also matched the Commodore serial port to an RS232 serial printer port.

2. Software compatibility—all the interfaces properly translated the Commodore character code to standard ASCII for all standard text, numeric, and punctuation characters.

3. Graphics emulation—the ability of the interface to generate the Commodore graphics characters with a graphic-capable dot matrix printer was carefully examined. All of the graphic interfaces did a reasonable job in this respect with all of our test printers. Most of the graphic interfaces exhibited a strong preference for a particular printer type.

4. Aspect ratio—concerns the width of a Commodore graphics character generated by the interface as compared to the printer's built-in text characters. Each printer uses a unique matrix for generating its character patterns. The interface should take the printer-specific pattern into account when generating the Commodore graphics characters. Failure to do so could result in the graphics characters being a different width than the printer's text characters. This may be undesirable for certain applications which mix text and Commodore graphics symbols.

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The 1525 printer can print 480 dots across an eight-inch line. Its character matrix is six dot positions wide and seven dots high. Text characters are a maximum of five dots wide, leaving a single dot space between each character. The Commodore graphics characters may use all six dot positions, causing consecutive characters to print one against the other. The Commodore graphics symbols are actually designed for side-by-side printing when used for creating charts and low-resolution graphic pictures. The important thing is that both a text character and a graphics character occupy the same space on the printed line. Note that the Commodore characters, when displayed on the video monitor, are actually printed in an eight-by-eight pixel square. Thus the 1525 printer cannot produce an exact replica of a screen-displayed character while in character mode.

In particular, our test printers had the following characteristics:

The C Itoh 8510 printer generates 640 dots on an eight-inch line. It is also capable of printing 768, 1088, and 1280 dots per line in its high density modes. Standard pica characters occupy eight horizontal dots. To produce proper emulation with the C Itoh 8510, the interface must generate the Commodore graphics characters in an eight dot wide pattern.

The Okidata 92 prints 480 dots on an eight-inch line. It is also capable of printing 792 dots per line in its high density mode. An Okidata 92 standard pica character is printed using a nine-by-nine dot matrix. It also has a correspondence quality mode which uses nine-by-seventeen dot matrix. The resulting character only occupies six of the line's 480 dot positions due to use of the printer's high density capabilities. To produce proper 1525 emulation with the Okidata 92, the interface must generate the Commodore graphics characters in a six dot wide pattern.

5. Printer control—indicates how well the interface performs with the different printers. For example, the Gemini 10X supports unidirectional printing of dot graphics. It must be told how many graphic bytes are to be printed before sending the actual graphic data. The code sequence for 480-dot-per-line graphics on the Gemini 10X is:

```
CHR$(27)CHR$(75)CHR$(nl)C
HR$(n2)CHR$(ml)CHR$(m2)..
```

where n1 and n2 count the actual number of graphic bytes, represented by m1,m2,..., which will follow. The number of graphic bytes is calculated by n1+n2*256. The dot values of each graphic byte are printed with the most significant bit at the top. If the interface sends the graphic data one byte at a time, the Gemini printhead will shuttle for each dot position as it lines up for printing. The printer in effect has to take a running start in order to properly place the next graphic byte. This shuttle operation disappears if the printer is told in advance the total number of graphic bytes which follow.

Interfaces which lack printer buffers are forced to send graphic data one byte at a time. Things are a little better when it comes to the Commodore graphic characters. The patterns for these are built into the interface, allowing them to be sent in eight-byte chunks. The result is that these interfaces slow up considerably when generating Commodore graphics or a high resolution screen dump in 1525 emulate mode with the Gemini 10X.

The C Itoh 8510 supports bidirectional printing of both text and graphics. As with the Gemini 10X, the printer must receive an advance byte count of graphic data. The code sequence for 640-dots-per-line graphics is as follows:

```
CHR$(27)CHR$(83)"jklm"CHR
$(nl)CHR$(n2)...
```

where jklm is a four-character string representing the number of graphic bytes, n1,n2,..., which follow. The dot values of each graphic byte are printed with the least significant bit at the top. (This is just the opposite of what happens with the Gemini 10X—above.) The C Itoh does not shuttle the printhead when printing graphics one byte at a time. The result is that there is no print speed penalty with the C Itoh 8510 when used with those interfaces which lack a print buffer.

The Okidata 92 supports unidirectional printing of dot graphics. Graphics mode is turned on by sending the printer a CHR$(3). All subsequent data is interpreted as a dot pattern by the printer. Graphics mode is turned off by sending a CHR$(3) code, followed immediately by a CHR$(2) code. In order to print the dot pattern generated by a CHR$(3) followed by the pattern generated by a CHR$(2), two of the CHR$(3) codes must be sent.

Unlike the Gemini or C Itoh printers, the Okidata prints seven vertical dots for each graphic byte with the least significant bit position at the top. The Okidata printer will also shuttle the printhead if graphic data is interspersed with text data.

The interface uses the associated printer's dot graphics mode to generate the Commodore graphics characters. As you can see, each printer type uses a different method for this purpose. The interface should accommodate these variations for proper results.

6. Print buffers—serve several purposes. As we saw above, a printer buffer can make a significant difference when working in graphics mode with different printers. Printer buffers also can free up the computer when printing large quantities of text. At a printing speed of 120 characters per second it can take many minutes to print a document which consists of several thousand characters. While it waits for the printer, the computer cannot do any other tasks. A printer buffer should accept data as fast as the computer can send it. Thus a large text file can be sent in just a few seconds to a printer buffer. The buffer stores the text until the printer is ready to accept it for printing, thus freeing up the computer for other work.

The useful size of a printer buffer varies. To prevent the shuttling effect mentioned above, a one-kilobyte buffer would be more than adequate. Considerably more memory is required to be of appreciable use for text. The exact value is dependent on the speed of the associated printer

and the user's work habits. In general, 16 kilobytes can be considered a good minimum.

7. Special listing modes—make reading of Commodore programs much easier. The interface substitutes a two- or three-letter mnemonic or an entire word for the Commodore graphic symbols which represent the various print control codes. The listing mode also makes it possible to print readable listing with letter quality printers which cannot reproduce the Commodore graphics symbols. Another listing mode prints all data as its ASCII code. This is useful for debugging printer control routines as it lets you see just what is being sent and not what you think is being sent to the printer.

8. Additional features—cover a number of miscellaneous functions such as interface control of margins, automatic pagination to skip over perforations, and special type fonts. All of the interfaces include several miniature switches for setting the operating parameters, selecting printer type, setting device number, and controlling Commodore emulation.

9. Line feeds—are important for different printer types. Most printers can be set to either include or omit a line feed with every carriage return. Some printers are permanently set one way or the other. This interface feature accommodates all printer types. The preferred mode is to turn line feeds off at the printer, allowing full control by the interface or the computer.

10. Transparent mode—turns off the Commodore emulation. The interface merely serves as a hardware link, passing all data to the printer unchanged. This provides the computer with direct access to the printer controls, allowing easier access to the specific printer features. Transparent mode is particularly useful with word processors which may be customized for different printer types. It also allows for much greater flexibility with screen dumps that recognize printers other than the 1525.

11. The Cardco secondary address standard—appears to be developing as the *de facto* control mode for Commodore interfaces.

In general, as with the 1525 printer, two software control methods have been adopted by the interfaces. The first is the direct transmission of ASCII code sequences to the interface. Each sequence usually starts with an escape code, CHR$(27). The other method is to set the interface to a particular operating mode by OPENing the channel with a particular secondary address.

Cardco, one of the first makers of Commodore printer interfaces, uses certain secondary addresses for a number of the more popular operating modes. Many software producers have adopted these secondary addresses in their programs when accessing non-Commodore printers. The ones we have in mind are:

Secondary Address	Function
0	Upper case/graphics with line feed
1	Upper case/graphics without line feed
4	Transparent mode with line feed
5	Transparent mode without line feed
7	Upper/lower case mode with line feed
8	Upper/lower case mode without line feed

In addition, some interfaces have adopted the Cardco practice of locking into the selected mode by adding twenty to the secondary address.

We are pleased to see the development of some uniformity for these commands. This type of standardization will only make it easier for all of us.

THE TEST PROCEDURE

Since the graphic interfaces are intended to provide total emulation of the Commodore 1525 printer, our first task was simply to run the Printer Test program Commodore provides on the Test/Demo disk included with every 1541 disk drive. This program exercises virtually every feature of the 1525 printer.

In addition, we tried several brief printer routines designed to utilize unusual combinations of 1525 commands. Some of these were included with the 1525 tutorial in the De-

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cember issue.

All printer interfaces which included buffers were exercised for proper handling of consecutive file dumps.

All tests were performed on a Gemini 10X printer, a C Itoh 8510 printer, and an Okidata 92 printer. The operating characteristics of these printers are representative of most of the popular printers. The Gemini is similar in operation to the Epson, BMC, and Mannesman Tally. The C Itoh is similar to the NEC and Prowriter printers. Nevertheless, we strongly recommend that you try out the particular printer interface combination you are contemplating before making a final decision. This report is not intended to be the last word in the operation of these interfaces. □

PRINTER INTERFACES: FOUR REVIEWS

By Morton Kevelson

This month we examine the Turboprint/GT, Grappler CD, Micrografix MW350, and Easy Print with Graphics printer interfaces. Next month we'll continue with the Xetec Printer Interface with Graphics, Xetec Serial Interface, Cardco Card?/+B and Card?/PS, Cardco Card?/+G, Tymac Connection, and Okimate Plug 'n Print.

All the interfaces reported on in this issue will work with both the VIC 20 and the C-64, with the exception of the Grappler CD, which will work only with the C-64. Because of the different power source connectors required by the Plus/4 and C-16 computers, none of this issue's interfaces will work with those computers, with the exception of the Micrografix MW350, which draws its power from certain printers like the Gemini 10X.

Interface	Turboprint/GT
Price	$99.95
Buffer	optional
Turbobuffer/B16:	16 kilobytes $99.95
Turbobuffer/B32:	32 kilobytes $129.95
Printer Optimization	C Itoh
ROM Version Tested	1.1
Warranty	1 year
Manufacturer	Telesys 43334 Bryant Street Fremont, CA 94539 415-651-2970

TURBOPRINT/GT

The Turboprint/GT provides total emulation of the Commodore 1525 printer when used with the C Itoh 8510 printer. The built-in Commodore character set was fully optimized for the C Itoh's eight-dot-wide character pattern. When printing the Commodore graphics characters, the interface used the printer's high-density dot graphics capabilities. This resulted in the best-formed graphics characters of all the tested units.

When equipped with one of the optional RAM buffers, the interface excelled in straight text printing. Its throughput for straight text appeared to have a slight edge in speed over the other tested units.

Operation with the Okidata or Star/Epson type printers was less than optimum. The Commodore graphics characters were two dot positions too wide, resulting in an improper aspect ratio. The interface did not utilize the optional buffer to optimize graphics operation. As a result, the Okidata and the Star/Epson type printers will exhibit excessive head shuttling when doing graphics in emulate mode.

ENHANCED FEATURES

The Turboprint/GT has four operating modes. These include total emulation of the 1525 printer in both upper case with graphics and in upper/lower case. A unique tag mode substitutes a pound symbol (#) for any unprintable characters. For example, all Commodore graphics characters would be so replaced when printing with a letter quality printer. The listing mode offers a full set of very readable three-letter mnemonics for all of the Commodore control codes. Graphics characters are represented by their respective keystroke sequences. For example, SHA represents a "shifted A" character and CMA represents a "Commodore A" character.

All operating modes are accessed via a specific secondary address, including the mandatory transparent mode. At least one PRINT# statement must follow the OPEN command to set the interface into the desired mode. This required that the interface be set to the proper mode before booting many programs. For example, transparent mode could not be accessed from within *East Script* or *Paper Clip* unless set beforehand. The lack of a hardware switch for this purpose was a further inconvenience.

THE HARDWARE

The interface is housed in a flat plastic case roughly three by five inches. Connection to the computer is via an unshielded multiconductor three-and-one-half-foot cable. The printer connection is via an eighteen-inch flat ribbon cable terminated with a standard Centronics connector. Power is taken from the cassette port on the back of the computer.

A cutout in the cover permits easy access to the four miniature switches. A red light emitting diode (LED) indicates when the interface is on. Three of the four switches are used to configure the interface for your particular printer. Of the eight possible switch combinations, six are presently implemented. One of the switch settings selects the universal mode. This total text setting turns off the graphics emulation for use with formed character printers, non-graphics printers, or other printer types not directly supported. The remaining switch is for hardware setting of device number four or five.

The switches which we missed the most were for the hardware selection of transparent mode and automatic line feed control. Although these settings are still available under software control, it is sometimes more

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Reader Service No. 184

convenient to be able to permanently preset time. Leaving out the transparent and line feed switches tends to limit the user options under some conditions.

OPTIONAL BUFFER

The buffer size of all the other interfaces was either two or four kilobytes. While this is large enough to accept a single-page letter, it is not large enough to offer appreciable benefit when printing longer documents. A four-kilobyte buffer takes less than one minute to print out at 120 characters per second. The purpose of these small buffers is to optimize the interface with the Okidata and Star/Epson printers by eliminating excessive head shuttling when printing graphics.

The Turboprint/GT has provisions for the addition of a 16- or 32-kilobyte RAM buffer. This represents a meaningful size when it comes to printing text. The larger buffer will gobble up about five minutes' worth of text with a high speed dot matrix printer. With a slow (12 character per second) letter quality printer, this translates to over a half an hour of text. Now if there was only some way to make the cable long enough to put the printer in another room...

Of additional significance is the fact that 32 kilobytes is larger than most word processor text buffers. For example, our largest *Easy Script* file was sent to the interface in less than 30 seconds. The buffer is actually large enough to hold two or three linked files while waiting for the printer.

Buffer installation is simple. It plugs directly into a multipin connector on the side of the interface. The connector is keyed to prevent improper insertion. The only drawback is that the resulting combination is twice the size of the original package.

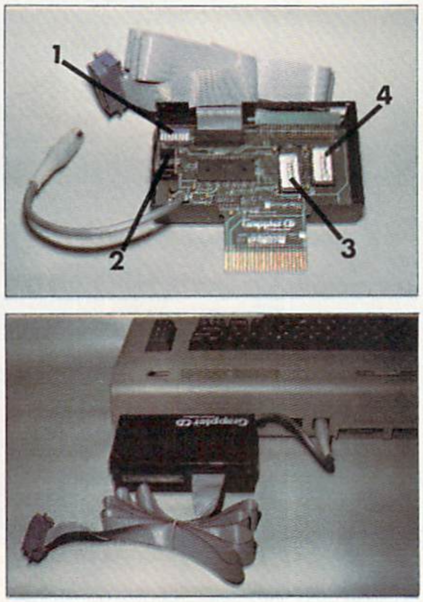
CONCLUSIONS

The Telesys Turboprint/GT is a good performer when used with a C Itoh type printer. Its primary attraction is the large buffer option.

The design of the interface appears still to be under revision. We received an upgrade ROM with some major modifications during the course of this review. The receptive attitude of the people at Telesys to our critical comments leads us to expect further improvements in the near future. □



Turboprint/GT: four operating modes.
READER SERVICE NO. 195



❶ Setup switches; ❷ serial port connector for 1541 disk drive; ❸ interface ROM (4K); ❹ screen dump and extra features ROM (4K). (Notes: Screen dump ROM occupies memory addresses 32768-40959 ($8000-$9FFF) in C-64 when activated by setup switches. Interface ROM does not appear in C-64 memory map.)

Grappler CD, inside (top) and out.
READER SERVICE NO. 196

Interface	Grappler CD
Price	$119.00
Buffer	none
Printer Optimization	Okidata, Star/Epson
Warranty	One Year
ROM Version Tested	1.1, 1.2
Manufacturer	Orange Micro Inc. 1400 North Lakeview Avenue Anaheim, CA 92807 714-779-2772

GRAPPLER CD

Orange Micro has been in the business of making computer peripherals for some time, having provided products in the past for the Apple and IBM personal computers. The Grappler CD printer interface is their first offering to the Commodore market. It is the most sophisticated of the group we looked at in terms of both hardware and software.

Actually, the Grappler is a two-part product. It definitely straddles the thin line separating a hardware interface and a software utility. On the one hand, it is a basic graphics interface which produces nearly total Commodore 1525 printer emulation with several different printers. The only limitation is its inability to print reverse characters. On the other hand, it has a built-in screen dump routine which would normally be considered a supplementary utility.

ENHANCED FEATURES

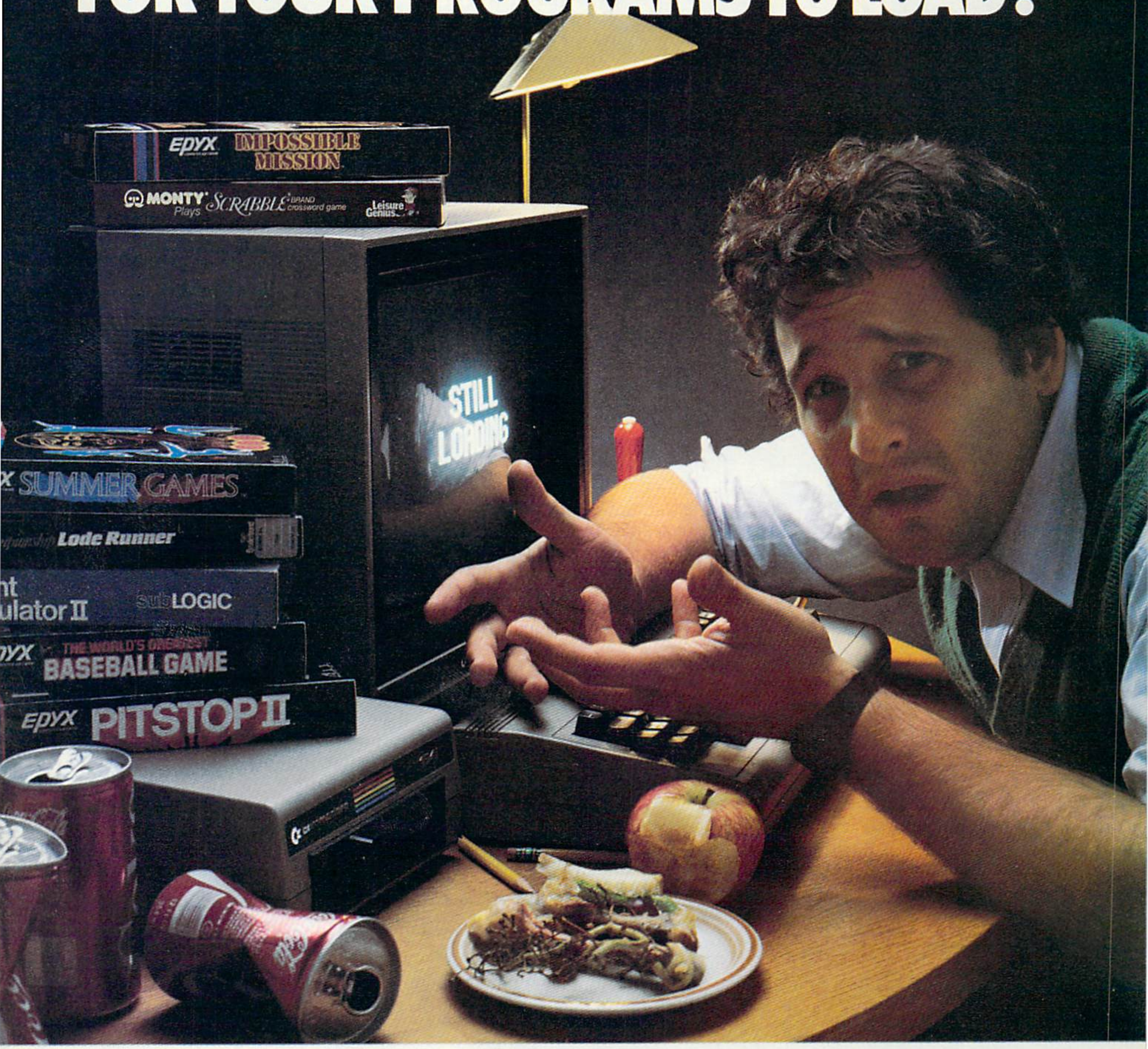
The user has the choice of selecting three operating modes via the secondary address of the OPEN command. These include total emulation in both upper case/graphics and upper/lower case, a special listing mode, and transparent mode. All modes can be accessed with and without line feed.

The special listing mode converts all of the Commodore print control codes to multicharacter (from two to seven characters long) mnemonics. All other non-standard characters are listed by their ASCII codes.

The Grappler CD also has a separate firmware utility built in. This consists of a high resolution screen dump as well as several printer operating enhancements. The driving software for these utilities is incorporated in an additional onboard ROM which must be switched in before powering up. The ROM is actually equivalent to a program cartridge installed in the C-64 expansion port. As such, it steals eight kilobytes from BASIC when it is in use.

When the extra ROM is initialized, the Grappler CD acquires a variety of high-resolution screen dumps. These will print a dot for dot dump of the 320 by 200 dot Commodore bit map. Depending on the associated printer, several variations are available. With all of the supported dot matrix printers, a single-size and

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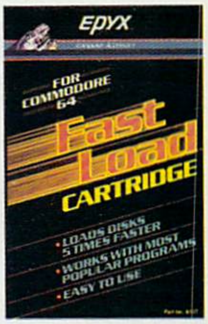
FAST LOAD can load, save and copy your disks five times faster than normal. It plugs into the cartridge port of your Commodore 64 and goes to work automatically, loading your disks with ease. And that's only the beginning. You can copy a single file, copy the whole disk, send disk commands, and even list directories without erasing programs stored in memory.

And unlike other products, the FAST LOAD CARTRIDGE works with most programs, even copy protected ones, including the most popular computer games.

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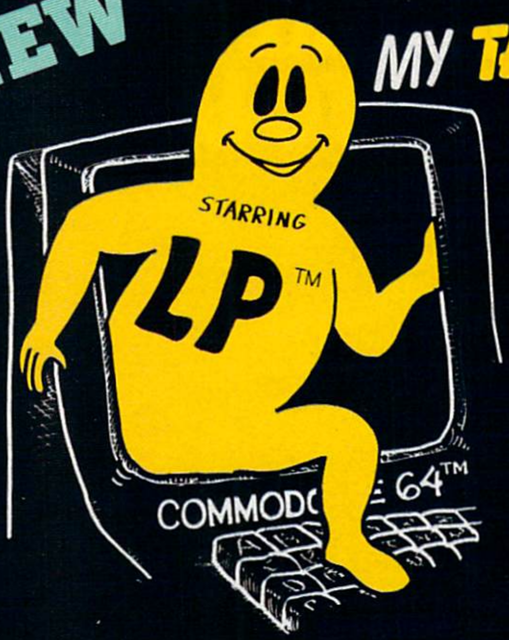
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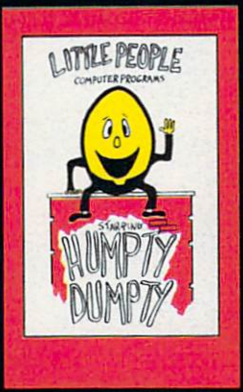
Little People Software

Developed by Parents and Educators

... Hearing ... Seeing ... Doing
In a way that makes LEARNING
more fun and more effective

No Synthesizer Needed

	L. P. Money I by Aaron Grant Teaches money values — one cent to one dollar — using a gum ball machine. Encourages money saving.	**L.P. Money II by Tom Wanne** Teaches money values — one dollar to one hundred dollars — using an ice cream machine. Encourages money saving.
L. P. Shapes by Doug Knapp Learn to recognize geometric shapes and how to spell their names.	**L. P. Traffic Signs by Tom Wanne** Teaches identification and meanings of traffic signs and signals. Increases safety awareness.	**L.P. Child Protection by Tom Wanne** Teaches children how to protect themselves against the possibility of being kidnapped. Excellent graphics.
L. P. Colors by Aaron Grant Teaches names and identification of colors and reinforces learning of colors and shapes.	**L. P.'s Farm by Aaron Grant** Teaches names and identification of farm animals.	**L.P. Addition by Doug Knapp** Teaches addition using numeric figures and objects. Nine levels of difficulty. Great introduction to math.
L.P. Subtraction by Doug Knapp Teaches subtraction using numeric figures and objects. Nine levels of difficulty. Great introduction to math.	**L.P. Opposites by Tom Wanne** Teaches opposites such as large, small; tall, short. Multiple choice quiz. Excellent graphics.	**L.P. Multiplication by Aaron Grant** Teaches multiplication using numeric figures and charts. Varying levels of difficulty.



Humpty Dumpty
Alphabet program by Dave Paulsen
Put Humpty together again and learn: the Alphabet, the Computer Keyboard, how to spell your Name ... and more.



Little Bo Peep
Number program by Joe Sams and Scott Barker
Bring Bo-Peep's sheep home and learn: to Count, to spell your Name, the Computer Keyboard ... and more.

CPSI **Computer Profit Systems, Inc.**
9661 Firdale Avenue
Edmonds, Washington 98020

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DEALER INQUIRIES INVITED

Reader Service No. 181

a double-size image are available. The latter prints four dots for every screen pixel, with the entire image rotated ninety degrees on the paper. The single-size image can be rotated ninety degrees as well. Both sizes can be printed either normal or inverted. In normal mode, a pixel which is turned on (that is, for which the corresponding bit is a one) will be printed as a dark dot by the screen dump. The inverted mode prints a pixel whose corresponding bit is off as a dark dot. This means that a high-resolution bit map image with the foreground color as white and the background color as black will print properly using the normal dump.

In addition, if you are using an Epson, Star, NEC 8023, or C Itoh 8510 printer, the screen dump can be "emphasized" with two closely spaced dots printed for every pixel. If you have an Epson FX/RX printer, the Grappler CD will also allow the use of its built-in aspect ratio feature for the screen dump.

The extra ROM also provides two screen character dumps. The first is a standard character dump and the second uses graphics spacing. This prints the screen image without any spacing between the Commodore graphics characters, providing an accurate reproduction of the screen display.

The Grappler CD also adds several features when the extra ROM is operating. These include setting of left and right page margins, printed line length, and page length with automatic perforation skip.

All of the extra ROM features are accessed via BASIC's standard PRINT statement. This is not the PRINT# statement associated with sending data to an OPEN channel. All Grappler CD commands are indicated by using a CTRL A (CHR$(1)) character in the print statement. There is even a Grappler command which allows the user to change the CTRL character which will be used to trigger a Grappler feature. This should be used judiciously, as the Commodore control codes can be produced in the same way.

THE HARDWARE

The Grappler CD is housed in a four-by-six-inch plastic case which is plugged into the Commodore expansion port. A short cable connects directly to the serial port. A serial port connector is provided on the left side of the interface for the use of additional peripherals, usually the disk drive. This would, of course, allow the connection of a second printer as well. A five-foot ribbon cable, terminated by a Centronics connector, completes the hookup to the printer. The ribbon cable is a bit long for a parallel connection of this type. Its length did not seem to create any operating problems, while still allowing for convenient positioning of the printer.

A second expansion slot, at the rear of the unit, allows for the use of other cartridges without having to unplug the interface.

A set of eight miniature switches is located at the back of the interface. Access to these switches is through two small slots at the back and side. Two of these switches are used to switch the extra ROM in and out of service. The extra ROM must be switched out to prevent the Grappler CD from interfering with the operation of any software or cartridges which utilize the memory space it normally occupies. With the ROM switched out, the extra features mentioned above will be lost.

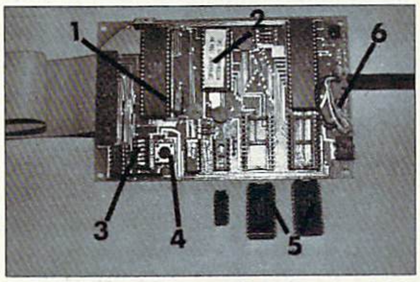
Two more of the switches enable hardware selection of the default operating mode as either emulation, listing, transparent, or total text. A third switch controls automatic line feed.

The final three switches enable selection of five printer groups. Separate settings are provided for the Epson, Star, NEC 8023/Prowriter, and Okidata printers. The fifth setting is a universal ASCII mode for none of the above.

CONCLUSION

The Grappler CD is the most sophisticated of all the interfaces we have looked at. Its built-in screen dump functions are normally considered as separate software utilities. Given all the built-in features of the Grappler CD, it has still managed to miss the boat with regard to the basics. The lack of a built-in buffer slows the printing of Commodore graphics characters with the Okidata and the Star/Epson type of printers. The six-dot-wide character pattern is optimum for the Gemini 10X, but unsuitable for the C Itoh 8510. The result is an interface with an abundance of features but less than optimum performance with any of our test printers. □





❶ 65C02 microprocessor; ❷ 8K interface ROM operating system; ❸ setup switches; ❹ reset pushbutton; ❺ 4K RAM buffer integrated circuits; ❻ jack for power cable to cassette or joystick port.

The intelligent Micrografix MW350.
READER SERVICE NO. 197

Interface	Micrografix MW350
Price	$129.00
Buffer	2K or 4K optional
Printer Optimization	All
Warranty	90 days
ROM Version Tested	1.5
Distributor	Micro-W Dist. Inc. P.O. Box 113 Pompton Plains, NJ 07444 201-838-9027

THE MICROGRAFIX MW350 INTERFACE

The MW350 provides total emulation of the Commodore 1525 printer when used with a compatible, graphics-capable, dot matrix printer. It was the only one of the tested interfaces which was optimized for all of our test printers, after installation of the optional buffer (more on this later). By optimization we mean the interface's ability to produce Commodore graphics characters which

are the same width as the associated printer's text characters. Also, for the Star/Epson type and Okidata printers, the head shuttling which occurs while emulating the Commodore graphics modes is kept to a minimum. The result is a minimum loss of printing speed.

ENHANCED FEATURES

When operating in emulate mode, the MW350 provides several useful features not available with the 1525. These include the ability to set the left and right margins, form length and single sheet mode. All of these features are set under software control by issuing a simple escape code sequence. Interface margins can be set from 0 to 255 characters. Note that the default for the right margin is eighty characters. The user should be aware of this to allow the interface to take full advantage of the extra characters per line offered by wide carriage printers or printing in condensed type mode. The right margin setting can be easily turned off by pressing the reset button during power up.

The special listing mode provided by the MW350 is one of the best we have seen. We will not describe it here, since starting with our October issue we have been using this interface to generate the program listings included in *Ahoy!* Simply turn to page 61 for a complete description of the listing mode. Note that the repeat character count feature for three or more identical consecutive characters is not part of the MW350 listing mode. These character counts are produced by a special program we have developed.

To assist with the debugging of printer routines, the MW350 includes a monitor mode. The monitor listing prints all characters as their equivalent three digit decimal ASCII codes. Thus a carriage return is listed as 013. The interface's reset button turns this mode off as any command codes would simply be listed with the rest of the data.

The remaining software control features include automatic line feed toggle, transparent operation, and software lock of the secondary address, which can be disabled only by turning off the interface. Transparent mode is accessed by opening a channel with a secondary address of 5. The MW350 will support more than one open channel at a time. This lets a transparent channel be used for direct control of your printer while sending text in emulate mode.

THE HARDWARE

The interface is housed in a flat plastic case roughly four by six inches (we have seen both black and white samples). Connection to the computer is via a shielded multiconductor five foot cable. The printer connection is via a three foot flat ribbon cable terminated with a standard Centronics connector. Power is normally taken from the five volt source available on pin 18 from most printers. A jack at one end of the interface allows easy connection of an adapter cable (a $10 option) which permits the interface to derive power from the computer. The adapter cable is terminated with either a cassette port connector or a joystick port connector. The latter is required for the SX64, which has no cassette port. Be sure to specify which you require when ordering.

A cutout in the cover permits easy access to the six miniature switches and the interface reset button. Three of the six switches are used to configure the interface for your particular printer. Of the eight possible switch combinations, only five are presently implemented. The remaining three combinations are for possible future expansion. One of the switch settings selects the universal mode. This total text setting turns off the graphic emulation for use with formed character printers, nongraphic printers, or other printer types not directly supported.

The three remaining switches are for hardware setting of automatic line feed, device number four or five, and transparent mode. These settings are important when using cartridge-based software, or any other software which does not permit issuing of the proper command codes. The functions of all the switch settings are summarized on the interface label adjacent to the switches.

Some of the functions of the reset button were discussed above. A brief status report may also be generated by pressing this switch. A concise printout provides several useful tidbits such as the ROM version number, buffer size, switch settings, and user options. The report serves as a quick verification of the user settings.

OPTIONAL BUFFER

The MW350 is an intelligent interface. The heart of the system is a 65C02 microprocessor. This is a low power (low in power consumption, not in processing power) version of the type of microprocessor used in the VIC 20 and the C-64. The operating system is stored in an eight-kilobyte ROM chip. Serial to parallel conversion is handled by a 6532 chip, similar to the complex interface adapters in the C-64.

The photograph shows three empty sockets on the circuit board. These are for the optional, user-installed, four-kilobyte buffer. The integrated circuits, directly below, show the proper orientation for final installation. The small chip is a 74LS10 integrated circuit. The larger chips are 6116, two-kilobyte, low power static RAM chips. To obtain optimum performance with the Star/Epson type of printers, at least two kilobytes of this buffer must be present.

The installation is simple enough for any hardware hacker. The uninitiated will be rightfully intimidated. Getting all 24 pins of the RAM chip into the socket requires a bit of practice. These chips are also adversely affected by static electricity. If you feel at all uncomfortable with this task, ask your dealer for assistance.

THE BUG

The timing of the Commodore serial bus is somewhat critical. It has presented problems for Commodore with their 1526 printer and 1540 and 1541 disk drives. It is therefore no surprise to have timing problems crop up on occasion with other serial bus peripherals. The more peripherals, the greater the likelihood of difficulty. We found that the MW350 would occasionally lock up the bus when used with the MSD SD-2 dual disk drive. However, we encountered no problems when using two

Back Issues of Ahoy!

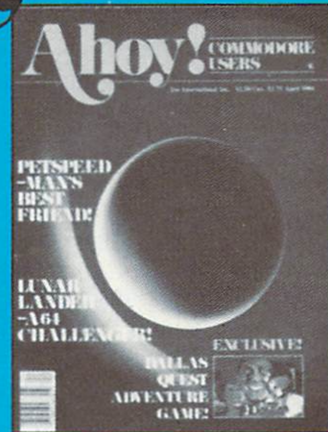



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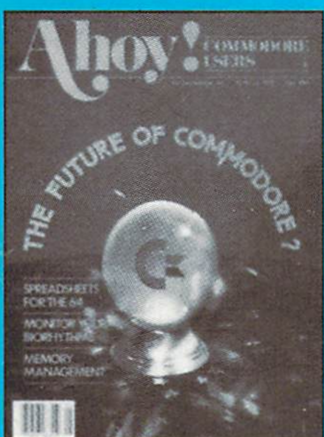
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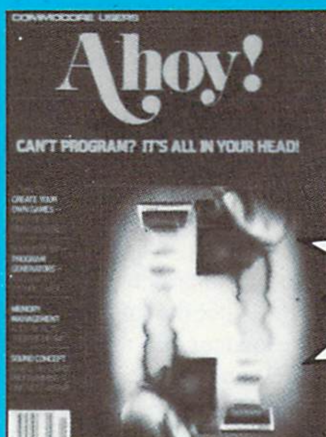
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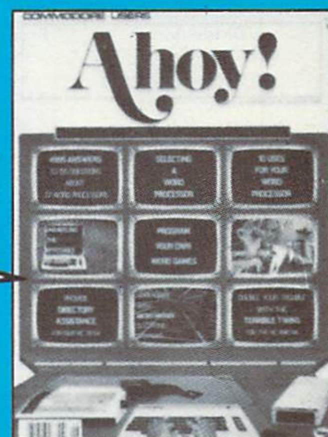
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Commodore 1541 disk drives. (As of this writing, an upgrade ROM from MSD has cleared up this problem.)

CONCLUSIONS

The MW350 is a highly versatile, high-performance interface. Conceived by Bob Kovacs, who also developed the Tymac Connection (*Ahoy!*, April 1984), the results of previous experience are clearly visible. On the other hand, this performance does not come cheap. The MW350 is the most expensive interface in this report. □

Interface	Easy Print with Graphics
Price	$119.00
Buffer	4K optional
Printer Optimization	All
ROM Version Tested	2.1
Warranty	90 days
Distributor	Progressive Peripherals & Software 2186 South Holly, Suite #2 Denver, CO 80222 303-759-5713

EASY PRINT WITH GRAPHICS

The Easy Print interface is identical to the MW350 above. The most obvious difference is the inclusion of a joystick port power cable in place of the built-in power jack. The only other built-in change is a revised greeting message which accompanies the status report.

The addition of the power cable eliminates the extra expense for an accessory power cable if your printer does not supply 5 volts at pin 18 of the Centronics connector. On the other hand, this cable must be used even if your printer does have the 5 volt supply, since the pin 18 connection from the interface to the printer has been eliminated. The joystick connector on our sample, was improperly assembled. The single electrical fitting in the nine pin "d" jack was improperly positioned. The minor reassembly which corrected this defect could pose problems for users unfamiliar with the hardware.

The big news here is not the interface (we said enough about its clone the MW350), but the accompanying disk, which contains the interface manual as well as several handy printer utilities. We generally find nothing wrong with disk-based documentation, but in this case we must take some exception. It took over an hour to generate a hard copy of the manual. This was not the fault of the interface, the printer, or the length of the 20-page, single-spaced manual, but of the agonizingly slow BASIC utility provided for this purpose. At least we only had to run this routine once.

Fortunately, the other programs on the disk were of far better quality. These included a reasonably competent screen dump program that does both high-resolution and multicolor dumps as well as sprites. The machine language code is designed to be accessed directly from BASIC. Six versions of the program, which LOAD into six different locations, are provided. This allows the user to select a version which will not conflict with existing software.

The program automatically selects the currently displayed image for printing. The user also has the option of passing parameters to the program to perform a dump of an image stored in any memory location. This allows the printing of one screen while displaying another.

When a multicolor image is printed, a 16-color gray scale is generated by using a different dot pattern for each color. The user can reassign the dot pattern color combinations for improved contrast of the printed image. The actual dot patterns remain unchanged, but are merely reassigned to different colors.

Other options include two sizes of the printed image and reversal of the print patterns. Partial screens may be printed by specifying the start and end dot lines—a very handy feature.

The screen dump is not for beginners. A knowledge of BASIC and Commodore graphics is required to take full advantage of its capabilities. The screen dump is called from within the user's own BASIC or machine language program. User options are passed to the routine by a series of POKE statements. Knowledgeable users should be able to write their own BASIC driver routines with very little difficulty. The program does fulfill its intended purpose as supplementary utility.

Two banner printing programs are included on the utility disk. One prints single-page "mini-posters" in characters up to eight lines high. This program allows the use of custom character sets. The disk includes samples of a futuristic style, an optical recognition style, and an Old English style character set. Although the manual mentions the use of user-created character sets, it does not provide any information on how to create them. The disk also omits a utility for this purpose. The second banner program, similar to the first, prints large size characters in the long dimension of the paper.

CONCLUSIONS

This is the same interface as the MW350 above. Only the marketing approach has been changed. The inclusion of the utility disk does give instant gratification by allowing your printer to perform. □

REVIEWED NEXT ISSUE:

Xetec GPI
Xetec SPI
Cardco Card?/+B
Cardco Card?/PS
Cardco Card?/+G
Tymac Connection
Okimate Plug 'n Print

FUTURE
FOR TH

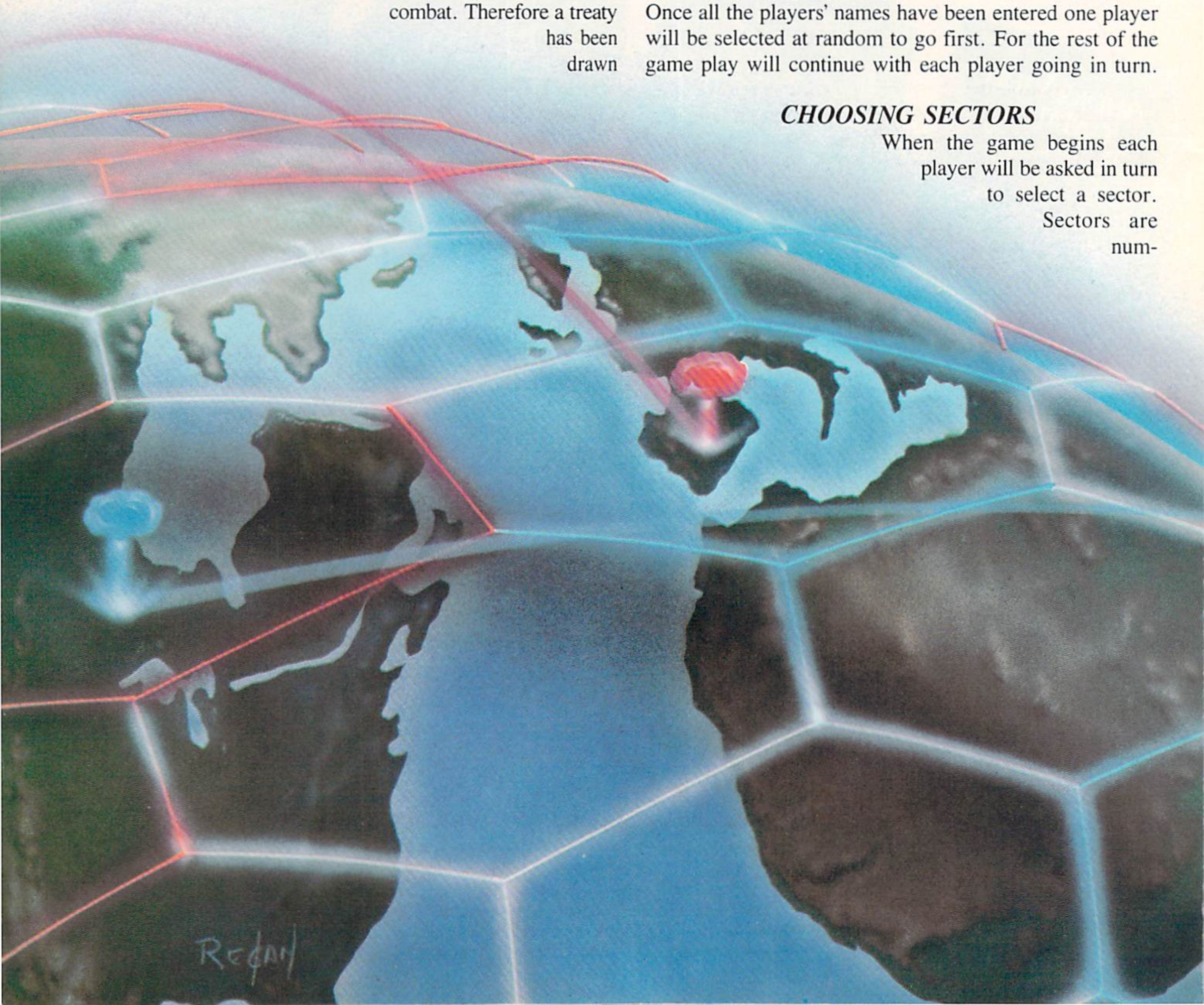
The time is the not so distant future. In the aftermath of World War IV the leaders of all six of the remaining countries meet in the city of New Haven, deep in the jungles of Antarctica.

Shielded from hellish viruses by the vast biodome, they have gathered to sign a treaty. With the world's total population now approaching the five million mark it has been decided that human life is too valuable to squander in armed combat. Therefore a treaty has been drawn up which outlaws physical conflict. From now on all wars and disputes will be settled by a computer program that will allow the combatants to engage in battle with no loss of life. This is that program.

The game of *Futurewar!* is played using 3 to 6 players. If fewer than 3 players are available the computer will provide the necessary opponent(s). If more than 2 but fewer than 6 are playing, the computer will ask if it can play also. Once all the players' names have been entered one player will be selected at random to go first. For the rest of the game play will continue with each player going in turn.

CHOOSING SECTORS

When the game begins each player will be asked in turn to select a sector. Sectors are num-



WAR!

E C·64

bered by column and row. Column numbers are 1 to 9 and row numbers are 1 to 4; therefore sector number 11 would be in column 1 and row 1. Sector number 94 would be in the last column on the right side and in the bottom row. A good strategy at this point would be to try to get as many complete columns as possible while preventing your opponents from doing the same.

DEPLOYING REINFORCEMENTS

Once the sectors are all claimed the players take turns placing their remaining armies, one at a time, in the sectors they control, the object being to strengthen their borders and prepare for attack. After all the remaining armies are deployed the message "Prepare for Battle!" will be displayed and the main part of the game will begin.

STATIONING TROOPS

Continuing in turn, each player will be given a number of armies based on the number of sectors he holds. Bonus armies will also be added, depending on the number of complete vertical columns a player controls. A certain degree of randomness has been included in this process so that it is possible for a weaker player to receive more armies than a player who controls more sectors. The player whose turn it is may place any or all of these armies in any sector he controls, repeating the process until all of his armies have been stationed.

ATTACKING

After his last army is stationed the player moves to his attack phase. If he answers "yes" when asked if he wants to attack, the player will be asked what sector he wants to attack. Only those sectors which contain more than one army and which have a common border with an enemy sector may make an attack. The player should enter the number of the sector he wishes to attack, press RETURN, and enter the number of the sector he is attacking from.

Now if the attacking sector contains more than two armies, the player will be asked to enter the strength of his attack. Attacking strength can be any number up to the limit displayed.

UNSUCCESSFUL ATTACKS

Should your attack prove unsuccessful, two things may happen. If the attacking sector has only one army remaining, you will be asked if you want to make a different attack. If the attacking sector has more than one army remaining, you will be asked if you want to repeat the same attack. If you answer "no," you will be asked if you want to make another attack.

SECTOR CONQUERED!

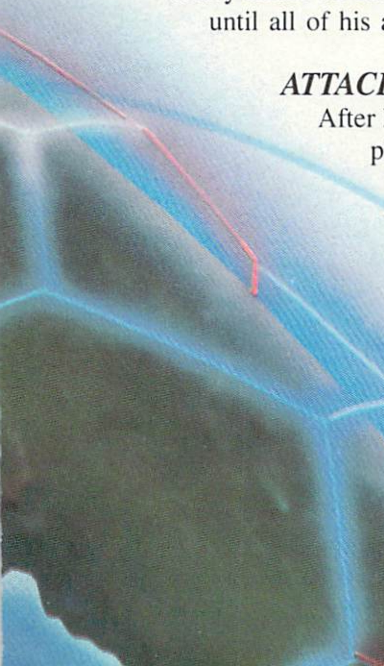
If you should make a successful attack you will be required to move in at least the number of armies that you attacked with. If, due to battle losses, you no longer have that many armies available, the computer will automatically move in whatever armies you have left minus one.

MOVING TROOPS

At the end of your turn you will be given the chance to move troops between any two adjacent sectors. This can only be done once each turn. Computer players do not move troops.

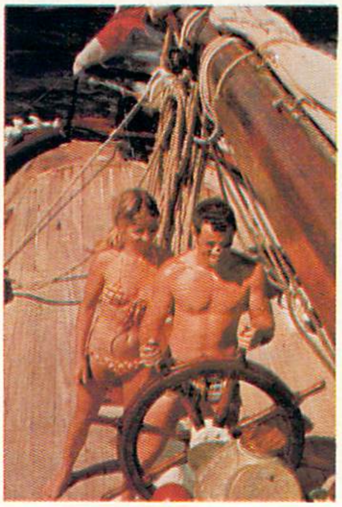
If you would like a copy of this or any of my programs please send a blank tape or disk and a self addressed stamped mailer along with $5.00 and the name of the program to: B.W. Behling, 232 Jackson St., Brooklyn, NY 11211.

Or order *Ahoy!*'s Program Disk or Cassette, which contains *all* the programs in this issue of *Ahoy!* (See page 80 for details.) □ ***SEE PROGRAM LISTING ON PAGE 63***



By B.W. Behling

Put the World on Hold!



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Continued from page 58

```
20 REM<><><><><><><><><><><><><><>
30 DEF FNGB(N)=-((X AND 2^N)>0)
40 INPUT"DECIMAL VALUE <256";X
50 IF X>255 THEN END
60 PRINT "BINARY VALUE: ";
70 FOR N=7 TO 0 STEP -1
80 PRINT FNGB(N);
90 NEXT N
100 PRINT
110 GOTO 40
```

Run this program and enter integer numbers. The program computes the binary equivalent bit by bit and prints it. Entering any number larger than 255 will allow you to exit from the program.

FNGB is a "get bit" function. The value of this function is either 0 or 1, depending upon the value of the Nth bit of the binary representation of X. If X is 65, the value of FNGB(6) is 1 since the binary equivalent of 65 is 0100 0001, and bit 6 equals 1. The value of FNGB(7) is 0 since bit 7 is a 0. The bits are numbered from 7 to 0 starting at the left digit of the number.

The function FNGB(N) evaluates (X AND 2 ^ N). The AND operation acts as a mask. Only the bits that are 1's in both X and in 2 ^ N are 1's in the result. All other bits are "masked off" or set to 0 in the result. An example will clarify this. If N is 6, then 2 ^ N is 0100 0000 in binary. We may show (65 AND 2 ^ 6) this way:

	0100 0001	65
AND	0100 0000	2 ^ 6
gives	0100 0000	64

Thus (65 AND 64) is 64. Only bit 6 is a 1 in both operands, and therefore only bit 6 is a 1 in the result. You may similarly show that 65 and 2 ^ 7 is 0, since there are no common 1's in the binary representation of those two numbers.

The function FNGB compares the result from the AND operation with zero: FNGB(N) = −((X AND 2 ^ N) > 0). If (X AND 2 ^ N) is greater than 0, the expression ((X AND 2 ^ N) > 0) is true and has a value of −1. If (X AND 2 ^ N) is not greater than 0, the expression ((X AND 2 ^ N) > 0) is false and is evaluated as 0. The leading minus sign completes the function definition, so that either a 1 or a 0 is returned depending on whether bit N is set to 1 or reset to 0 in the variable X.

Consequently, if X = 35 (0010 0011), then FNGB(N) is equal to 1 for N = 0, 1, and 5, and FNGB(N) equals 0 for other values of N.

So much for the preliminaries. You don't have to be a binary expert (or even understand what we've just been through) to be able to successfully create and manipulate sprites. That's true only if you have some programs to tell the computer how to do all the work for you. Let's look at such programs.

SPRITE CREATION

This month's *Multicolor Sprite Maker/Saver* program on page 71 is similar to last month's version for high-resolution sprites. The procedure for using the program is to LIST it first. Move the cursor around in the 12 by 21 array of dots, and change any dots to either *'s, 1's, or 2's to represent the various colors throughout the sprite. Once the DATA statements are complete, move the cursor up to line 1001 and press the RETURN key 21 times. This will enter all of your sprite information into the program.

Next you RUN the program, and the computer interprets the various color codes and converts them to the proper numbers. These numbers are POKEd into the block of memory that you must specify. They are also stored in a sequential file, either on tape or disk (note line 25), under the filename which you specify.

At this point you could repeat the above procedure to define additional sprites. Once all the sprite data is in memory, you may load and run your own program or the *Sprite Controller* program on page 71 to initialize and manipulate the sprites as you wish.

You may also reload the sprite data at a later time by reading the sequential files back into memory by means of the *Sprite Loader* program on page 71. You may prefer to make the *Sprite Loader* part of your own program so that the sprite data gets loaded whenever your program is run.

The *Sprite Controller* program is presented primarily as a handy reference. It gives examples of the types of functions you need to define and control your sprites. Your program must include lines 10 through 40. You may include any or all of the subroutines, depending upon the requirements of your program.

Also you may prefer to use "in-line code" rather than subroutines. This simply means that wherever you need a particular sprite function, you use the lines corresponding to that function without using the RETURN statement at the end. You may gain some speed advantage at the expense of greater memory requirements by using in-line code rather than subroutines.

Each subroutine lists the variable(s) that must be defined before the subroutine is called. Most routines require a value for SN which is the Sprite Number of the sprite in question. BK is the block number in which you have stored the sprite data. XX and YY are the screen coordinates where the upper left corner of the sprite is to be located. CC, C1, and C2 are the Sprite Color, Multicolor #1 and Multicolor #2 respectively.

Only the collision detection subroutines return values to the calling program. If you want to know whether Sprite A is colliding with Sprite B, your program must specify sprite numbers for SA and SB and then GOSUB 2200. Upon the return from the subroutine, you must check the value of SFLG. If it is 0, no collision has occurred. If SFLG is 1, Sprite A and Sprite B are currently colliding.

Most of the subroutines are self-explanatory. Some are mutually exclusive. For example, you can't define a sprite as being both multicolor and high resolution. An expanded sprite is made twice as large in the chosen direction. A sprite expanded both vertically and hor-

izontally is four times as large as a normal sprite. The resolution is not increased by expansion. Small blocks simply become larger blocks.

Sprites follow a priority scheme. Sprites with lower numbers appear on the screen in front of sprites with higher numbers. Think of the sprites as being on different layers or planes on the screen. Sprite 0 is in front and sprite 7 is at the rear. If sprite 0 coincides with any other sprite, all of sprite 0 will be visible, and only the portion of the other sprite which is behind the background color portions of sprite 0 will be seen.

Each sprite may be defined to have a higher or lower priority than the background objects on the screen, such as text or graphics characters. Once again, a higher priority object appears in front of a lower priority one.

Two sprites collide when a non-background color part of one is at the same screen location as a non-background color part of the other. When either one moves into this collision position, two bits in VIC-II register 30 are set. If three sprites collide so that A collides with B and B collides with C, it is not possible to tell from the collision register whether A is also colliding with C. Three collision bits will be set, but your program would have to look at the screen locations of the sprites to determine which of the sprites actually overlap. PEEKing at the collision register clears all the bits back to zero. The bits remain cleared until a sprite is moved, causing another collision.

Similarly a bit is set in VIC-II register 31 for each sprite which is in collision with a background object. Background objects are simply screen data such as graphics characters. Such objects which have multicolor value 01 are treated as being transparent and do not collide with sprites. Once again, PEEKing at this collision register clears all its bits to zero until another collision occurs.

ON YOUR OWN

Hopefully, these programs and discussions provide you with the tools to create and successfully utilize sprites in your programs. Just as with other aspects of programming, you must experiment and practice to feel comfortable using sprites.

Here are a few odds and ends you might consider:

Create some simple sprites in the shapes of the numerals 0, 1, and 2. It's easy to keep track of each sprite that way. See how each one behaves under different conditions. For example, expand #0 horizontally and #1 vertically. Move #1 until it collides with #2 then look at the collision register.

Set the pointer for sprite #3 to point to the same memory location as sprite #0, but put the two sprites at different locations on the screen. Make one of them multicolor and make the other high-resolution.

Once you have loaded the *Sprite Controller* program, you may easily add and change your own instructions after line 40. Then run the program to quickly see the effects on the sprites on the screen. You may also type in the direct mode to immediately modify the sprites. Run the program. When it stops, type SN=0:GOSUB 2000, for example, to instantly change sprite 0's background priority. Type SN=1 : XX=200 : GOSUB 600 to quickly move sprite #1 to a new position. You will quickly get a feeling for how each of the subroutines behaves. The *Sprite Sampler* program on page 72 shows what it takes to initialize three sprites which you have already stored in memory. Nothing more than a sequence of subroutine calls is needed to make the sprites do whatever you want them to do.

Keep in mind that several identical sprites may be defined by setting all of their pointers to the same block in memory. Also remember that you can instantly change a sprite's appearance by simply changing the value of its pointer. In fact you could make a sprite go through many transformations by first defining several images and storing each one in a separate memory block. Then simply change the sprite's pointer in the desired sequence.

Rapidly altering a sprite's size and type can produce some interesting effects. For some truly unique results, try setting a sprite's pointer to various random places throughout RAM. The sprite will actually give you a window into what's happening in RAM.

Without the drudgery and tedium of controlling these beasts, you may find that the world of sprites is an interesting area for exploration. □

SEE PROGRAM LISTINGS ON PAGE 71

COMING IN THE MARCH AHOY! (ON SALE FEBRUARY 12)

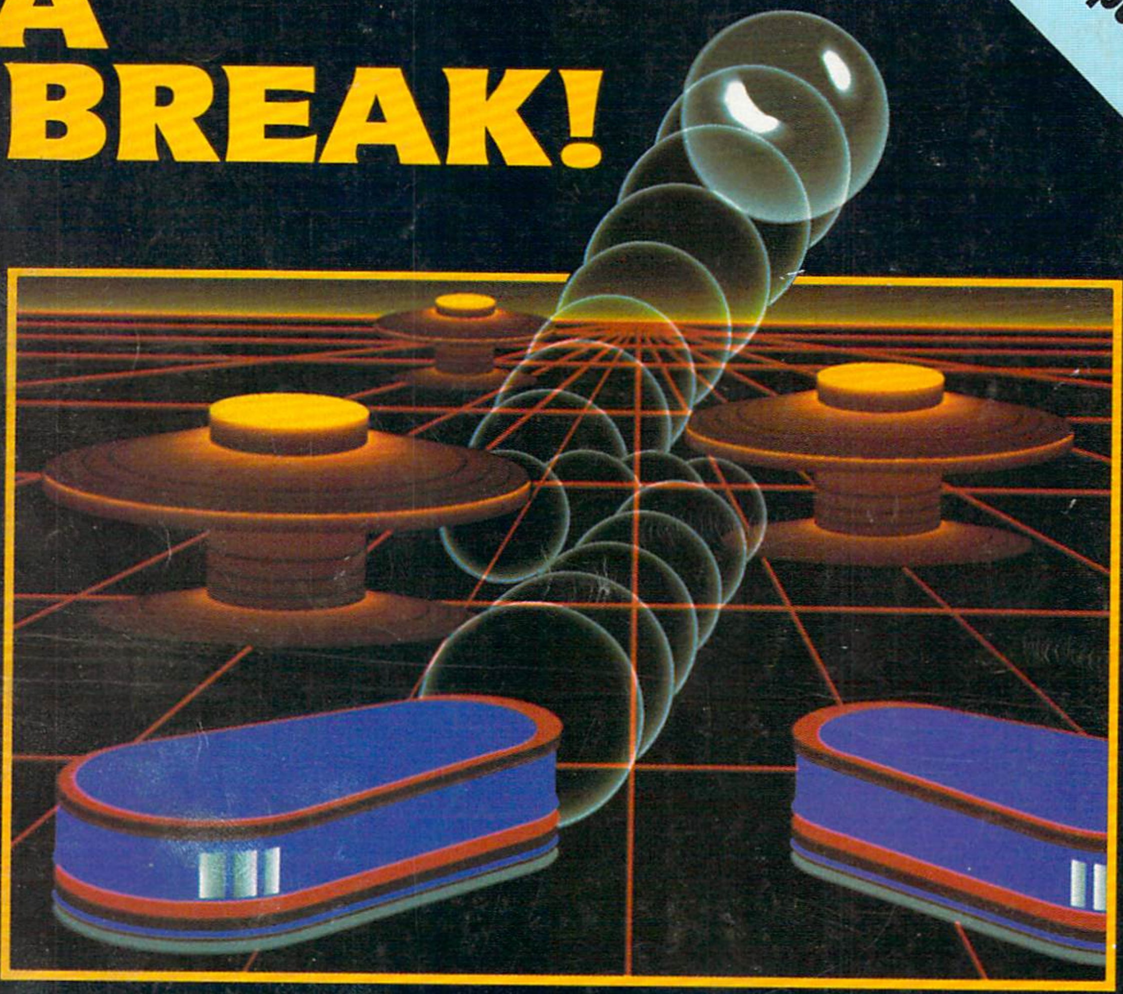
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